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61/099,249 23 September 2008 (23.09.2008) US(71) Applicant (for all designated States except US): **L'OREAL** [FR/FR]; 14 rue Royale, F-75008 Paris (FR).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **FONTAINE, Michel** [FR/FR]; 23 rue de l'Arcade, F-75008 Paris (FR).
DURU, Nicolas [FR/FR]; 4 rue d'Arsonval, F-75015 Paris (FR).(74) Agent: **TANTY, François**; Nony, 3 rue de Penthièvre, F-75008 Paris (FR).

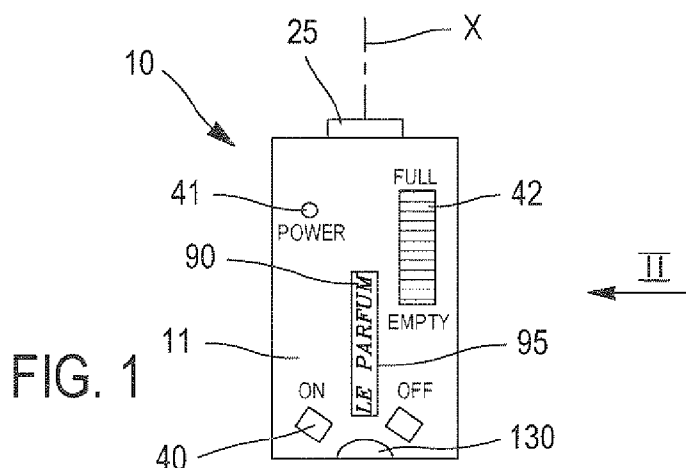
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(54) Title: SPRAYING DEVICE



(57) Abstract: The present invention relates to a spraying device(10) including: -a casing (11) including a base, -a transducer powered by an electric source and producing vibrations, -a container removably received in the casing (11), containing the product to be sprayed, -a spray head removably received in the casing, connected through a passage for the product flow to the container, including a grid provided with at least one spray orifice and a receiving membrane for receiving vibrations from the transducer and for transmitting them to the product present between the grid and the receiving membrane, in order to cause its spraying by the grid, -a system for mounting the spray head, so as to ensure transmission of the vibrations of the transducer to the receiving membrane, -a lid guided in displacement relatively to the base, between a closed position and an open position, the lid being configured in order to block the spray head in the closed position.

Spraying device

The present invention relates to spraying devices more particularly but not exclusively, to those intended for spraying a cosmetic product, notably a perfumed substance.

5 The object of the present invention is notably a spraying device intended for personal use, notably in order to perfume the user of the device.

Patent US 6,722,582 discloses a spraying device including a stainless steel membrane crossed by a central aperture and held at its periphery by a support. A ring-shaped piezoelectric element is attached on one side of the membrane. A silicon
10 element defining a spraying grid is attached on the opposite side of the membrane. The spraying grid is supplied with product from a chamber for storing the product to be sprayed, formed between the support and the membrane. Supplying the grid is performed through a passage with reduced height, formed between the silicon element and a protrusion of the support. The spraying grid and the piezoelectric element are
15 interdependent on each other and because of this, their recycling is made difficult at the end of the lifetime of the device.

The application US 2004/0263567 A1 discloses a spraying device including a silicon grid borne by a support in polymeric material. The spray chamber is supplied through capillary channels.

20 Patent US 4,702,418 discloses a spraying apparatus including a cartridge containing the substance to be sprayed, having a container located in its upper portion in order to feed by gravity a spraying grid placed at a lower level.

In an exemplary embodiment, a vibrating element is borne by a ring-shaped rib of the apparatus and the cartridge includes a flexible wall which will come into contact
25 with a relief of the vibrating element, which ensures transmission of the vibrations to the substance and its spraying by the grid. In other exemplary embodiments, the vibrating element is permanently interdependent on the cartridge.

Many spraying devices for personal use are known, for example from the publications FR 2 902 088, EP 1 875 969, FR 2 886 174, FR 2 905 612 or FR 2 905 568.

30 The publication EP 1 559 436 A1 describes a spraying device in which the product to be sprayed may be contained in a container formed by a pouch without any air return. The container is removably mounted on the device and communicates with a spray

chamber opening out on a spraying grid through a valve which ensures sealing of the container when the latter is removed. Such a device is not entirely satisfactory for mobile use since the spraying grid may let product escape in the absence of use, even in the case when the valve is closed, if some product remains contained in the spray chamber and if the device is badly oriented, which may be the case when it is transported in a handbag for example. Further, with such a device, it is not possible to change the diffused product by replacing a container present in the device with a container containing a different product without a small fraction of the product contained in the container initially present being sprayed before the new product. This may lead the user to wanting to spray some product in the atmosphere in order to purge the device before directing it towards him/her, which is not always desirable. Further, the presence of the valve complicates the manufacturing of the device and may make the latter costly, not very compatible with large scale circulation. Finally, the evaporation of the product present in the spray chamber in the absence of use, through orifices of the spraying grid, may lead to an intake of air, which may perturb the supply by capillarity of the spray chamber from the container.

Moreover, many spraying devices exist, which have the format of a portable telephone, for example disclosed in publications US 2003/0206834 A1, DE 10115522, DE 20115776 and US 2006/0062408 A1. However these devices are not specifically aimed at finding a remedy to the above drawbacks.

FR 2 816 812 describes a casing with a sliding lid.

There exists a need for benefiting from a spraying device which may be used for spraying a perfume, in order to allow a user to wear perfume, which operates reliably, is capable of being carried in a handbag for example, simple to use and allowing the user to easily change the sprayed product as desired, while having non-negligible autonomy.

The invention aims at meeting this need.

The object of the invention is thus a spraying device including:

- a casing including a base,
- a transducer powered by an electric source and producing vibrations,
- a container removably received in the casing, containing the product to be

sprayed,

- a spray head removably received in the casing, connected through a passage for the product flow to the container, including a grid provided with at least one

spray orifice and one receiving membrane for receiving vibrations from the transducer and transmitting them to the product present between the grid and the receiving membrane, in order to cause its spraying by the grid,

- a system for mounting the spray head on the casing, so as to ensure transmission of the vibrations of the transducer to the receiving membrane,

- a lid guided in displacement relatively to the base, between a closed position and an open position, the lid being configured in order to block the spray head in the closed position.

By means of the invention, the user benefits from a device capable of being easily carried, without any risk of leak, thanks to the sealed closure of the casing, while being easily brought into a configuration of use by displacing the lid.

The removability of the spray head and of the container enables both of them to be removed from the casing, for example simultaneously, in order to replace them with another spray head and an associated container, with the advantage of not contaminating one of the products with the other one and of avoiding any unnecessary spraying into the atmosphere for purging the spray head.

The sealed closure of the device also avoids evaporation of the product contained in the spray head and the risk of air-binding the supply of the spray head by intake of air entering the spray head.

The device according to the invention is further practical to use, users today being widely acquainted with the use of portable telephones, notably those which are switched on by sliding the lid relatively to the base.

The container may advantageously include a flexible pouch without return of air, containing the product to be sprayed.

The use of such a pouch reduces the risk of air intake, as the container is gradually emptied, so it further limits the risk of air-binding the supply of the spray head.

The lid may exert pressure on a sealed surface of the spray head in order to sealably block it, when the casing is closed. One of the head and of the lid may include an elastomeric gasket surrounding a spraying area, this gasket being compressed when the lid is in the closed position. The lid may be guided when sliding relatively to the base and may slide with a movement bringing it closer to the base in the closed position, in order to exert this pressure. The sealed surface is then for example defined at least partly by an

elastomeric gasket surrounding the spraying area when the casing is closed, this gasket being compressed when the casing is closed. The sealed surface may further be defined at least partly by a conical surface or by a seal lip.

The spray head may include a plastic supporting part overmolded on the grid.

- 5 This supporting part may be assembled with a second part, overmolded on the receiving membrane, or at the receiving membrane itself.

The spray head may include an endpiece on which the container is heat-welded. This endpiece is for example molded monolithically with the part supporting the spraying grid.

- 10 The lid may include a holding system on the base which is unlockable, in order to allow complete detachment of the lid from the base, notably for facilitating the placement of the container.

- The spraying device may include a system for blocking the product flow passage between the spray head and the container. Alternatively, this passage may be permanently open. This blocking system may be opened or closed selectively, or alternatively opened upon first use and remaining open subsequently without it being able to return to a blocking configuration.

The base may include a housing in which the head may be attached by sliding.

- 20 The base may include a part for retaining the spray head in its position of use, for example to be pulled down onto the spray head in order to keep it in place on the base.

Fluid communication between the spray head and the container may be capillary. The spraying device may thus include a capillary tube extending from the spray head inside the container, notably on the major portion of the length of the container.

- 25 Displacement of the lid towards the open position may allow activation of an electric circuit for energizing the transducer. No spraying may be possible, in an exemplary embodiment of the invention, before the lid is in the open position.

The spraying device may include a button for triggering off the spraying, which may for example be actuated with the forefinger when the user holds the device in his/her hand.

- 30 The object of the invention is also an assembly, further called a refill, which may be used in a spraying device as defined above, including:

- a spray head including a spraying grid and a receiving membrane defining with the grid a chamber for receiving the product to be sprayed,
- a container including a flexible heat-welded pouch on the endpiece of the spray head.

5 The height of the chamber is comprised for example between 0.01 mm and 1 mm.

 The chamber may have at least one capillary portion, for example with a height less than or equal to 0.2 mm. The height of the chamber may be selected for example depending on the flow rate to be sprayed. The chamber may be without any porous
10 material.

 The receiving membrane intended to transmit pressure waves to the product is for example in metal, preferably in stainless steel. This receiving membrane extends at least partly facing the grid and has a free face on the opposite side, in the absence of use in the spraying device.

15 The grid may be crossed by a single spray orifice. The grid may also include a plurality of spray orifices, for example at least 50 spray orifices, for example between 100 and 600 spray orifices.

 The receiving membrane may be attached in various ways onto the remainder of the spray head, for example by any means able to guarantee a sealed assembly, for
20 example overmolding, crimping, heading, ultrasonic welding, laser welding, adhesive bonding, bi-injection.

 The spraying area may be closed by a removable cap, before first use or by a blocking system which may be attached at will on the spray head in order to block it, so as to seal the refill when it is removed from the spraying device and there remains some
25 product therein, with view to subsequent reuse.

 The spray head may include a connecting endpiece on which the pouch may be welded, this endpiece for example having a flattened cross-section, in order to minimize stresses in the pouch.

 The invention will be better understood upon reading the detailed description
30 which follows, of exemplary non-limiting embodiments of the latter, and upon examining the appended drawing, wherein:

- Fig. 1 is an elevational front view of an exemplary spraying device made according to the invention,

- Fig. 2 is a side view along II of Fig. 1, the casing being closed,

- Fig. 3 a similar view to Fig. 1, the casing being open,

5 - Fig. 4 illustrates the open casing and the part for retaining the spray head, in the open position,

- Fig. 5 is a side view along V of Fig. 3,

- Fig. 6 is a schematic sectional view illustrating the sealed application of the lid onto the spray head, in the closed position of the casing,

10 - Fig. 7 illustrates exemplary reliefs for guiding the lid, the latter being in the closed position,

- Fig. 8 is a similar view to Fig. 7, the casing being open,

- Fig. 9 illustrates the refill separately, before its placement in the casing,

- Fig. 10 is a bottom view along X of Fig. 9,

15 - Fig. 11 is an exploded view of the refill of Fig. 9,

- Fig. 12 illustrates an embodiment detail of the device, under the spray head,

- Fig. 13 is a similar view to Fig. 12, after placing the spray head, and

- Fig. 14 illustrates an alternative for holding the spray head on the base.

20 The spraying device 10 illustrated in Figs. 1-5 includes a casing 11, the format of which is that of a portable hand-held telephone. This casing 11 includes a base 12 and a lid 14 which may be moved in a guided way relatively to the base, in the case in point which may slide along an axis X parallel to the longitudinal axis of the casing, in the relevant example.

25 The lid 14 may be moved between two stable positions, one closed position, illustrated in Figs. 1 and 2, and the other open position illustrated in Figs. 3-5.

Elastic or magnetic means may be used if necessary for ensuring that the lid is held in the open or closed position in which it is left by the user. These elastic or magnetic means may if necessary assist with the movement for opening or closing the lid.

30 In the relevant example, in the open position, the lid 14 uncovers between one quarter and half of the base 12, so as to exhibit a spraying area 16 in a direction Z, in front

of a spraying grid 20 belonging to a spray head 22. The direction Z is for example perpendicular to the axis X.

The casing 11 includes a button which is located in the relevant example at one longitudinal end of the casing 11 but which may further alternatively be located elsewhere, notably on the side of the casing in proximity to its longitudinal end, the button 25 being advantageously actuated by the forefinger.

The casing 11 houses an electric source 200 comprising one or more battery cells or batteries, for example housed in the base 12 or the lid 14, an electronic circuit 210 powered by the electric source and a transducer energized by the electronic circuit in order to produce vibrations, which are transmitted to the spray head in order to cause diffusion of the product as fine droplets.

The electronic circuit 210 is for example produced according to the teaching of EP 1 875 969.

The transducer may appear as a ring 30, as illustrated in Fig. 12, attached on the inner face 31 of a vibrating membrane 32 (further called actuating membrane) against which the spray head 22 is applied, once it is mounted in the casing 11 as illustrated in Fig. 13.

The refill may include an RFID device, which may for example contain in a memory, data on the nature of the substance and/or multimedia data to be broadcasted upon spraying. The spraying device may include a system for displaying data contained in the refill.

The refill may include a means for identifying the product contained inside, in order to allow the spraying device to adapt the excitation characteristics of the vibrating membrane, for example to adapt them to the viscosity of the product. The identification means may be a specific relief present on the refill, an optical or magnetic code, an electric circuit with or without any contact. The spraying device is adapted in order to read the identification means, and includes for example a mechanical feeler, an optical, magnetic or radiofrequency reader, a reader with electrical contacts or without any contact.

The vibrating membrane 32 may be made in metal, for example in stainless steel.

The frequency of vibrations of the vibrating membrane may be comprised between 100 and 300 kHz, for example comprised between 160 and 190 kHz.

The spraying device 10 may include a user interface which, in addition to the actuation button 25, may include one or more on/off buttons 40, an operating light indicator 41 and a possible gauge 42 informing the user on the product level which may still be sprayed, for example in the form of a bargraph.

5 The product to be sprayed is contained, in the relevant example, in a container 50 which is illustrated in Fig. 9 -11.

This container 50 is advantageously formed by a flexible pouch which may be emptied without return of air.

10 The spray head 22 includes a supporting part 55 which supports the spraying grid 20, this supporting part 55 being for example overmolded on the spraying grid 20.

The supporting part 55 may be made, as this is seen in Fig. 11, with an endpiece 68 which may have a flattened shape adapted to attachment of the flexible pouch 50 on the spray head, notably by ultrasonic welding.

In Figs. 9-11, the pouch is illustrated in the empty condition, flattened.

15 The pouch may for example include two sheets which define the main faces thereof and which are heat-welded onto each other at their periphery. Example of sheets which may be used for making the pouch 50 are described in application EP 1 669 305 of the Applicant.

20 The supporting part 55 may be made with at its periphery a ring-shaped rib 73 with low height, on which is attached a receiving membrane 75 intended to receive the vibrations transmitted by the vibrating membrane 32, as this may be seen in Fig. 13, once the spray head 22 is placed in the casing 11.

25 The distance between the receiving membrane 75 and the spraying grid 20 is preferably sufficiently small so that the product feeds the chamber located between the receiving membrane 75 and the spraying grid 20 by capillarity, as product droplets are gradually ejected by the grid 20.

The supporting part 55 is for example made in any synthetic material or in metal, and the receiving membrane 75 in a metal, for example in stainless steel, for example stainless steel 316 and for example made with a thickness of about 250 μm .

30 The grid 20 is crossed in the relevant example by a plurality of spray orifices, these orifices each for example being with an axis parallel to the spraying axis Z of the grid 20. The spray orifices are for example distributed in groups, with regular spacing between

the spray orifices within each of the groups. The grid 20 for example includes 480 holes with a diameter of 7 μm .

The grid 11 is for example in silicon, but other materials may be used without departing from the scope of the present invention. The grid 20 may be a micro-machined grid, for example a micro-machined silicon grid.

A capillary tube 80 may be attached to the spray head 22 and extend in the pouch 50 until it is near its bottom. This capillary tube 80 may open out into the chamber made between the receiving membrane 75 and the supporting part 22. The capillary tube 80 may also play the role of an anti-trapping device in order to avoid that the sheets of the pouch by pressing against each other prevent the product from freely flowing towards the spray head.

The pouch 50 may include if necessary on its front face, i.e. on the same side as the spraying area 16, a decoration and/or information 90 relating to the nature of the product contained in the pouch 50 and this information 90 may optionally be visible when the casing 11 is closed, by making a transparent window 95 in the lid 14 or alternatively in the casing. The user may thereby be informed on the nature of the product contained inside the casing. Alternatively, the pouch 50 is not used as an information carrier and for example it is the spray head which plays this role. Further alternatively, neither the spray head nor the container includes any information on the nature of the product contained inside. The lid 14 may of course be made without the window 95.

The lid 14 seals the casing 10 in the closed position, i.e. the spraying space 100 located below the grid 20 is isolated from the surrounding air outside the casing 11, so that evaporation of the product through the orifices of the spraying grid 20 may be avoided.

The lid 14 may bear sealing means 110 such as a ring-shaped gasket for example, which may be added or overmolded on a wall 111 of the lid 14 and this sealing means 110 may be sealably applied on a seal surface 112 of the spray head 22. This seal surface 112 is for example a ring-shaped portion of the front face of the supporting part 55 of the spray head 22, as this may be seen in Fig. 6.

The sealing means 110 may further be made otherwise, for example with a seal lip made in the same material as the wall 111 of the lid 14, this seal lip may be for example applied against a for example conical surface of the spray head, for example a surface

delimiting the aperture 113 through which the grid 20 communicates with the outside, in order to obtain a seal by engagement of ring-shaped surfaces onto each other.

The spray head 22 may further be made with a seal gasket, for example in elastomer, for example an O-ring gasket, or with a seal lip, which is applied against a seal surface of the lid 14 when the casing is closed.

Preferably, the movement of the lid 14 relatively to the base 12 is such that in the closed position, the sealing means 110 of the lid will be applied with positive engagement against the spray head 22. In order to obtain a lid 14 applied in such a way on the base, it is for example possible to make the base with rails 120 for guiding the movement of the lid, as illustrated in Fig. 7, including a rectilinear portion 120a, allowing a movement of the lid 14 parallel to the base 12 and an oblique portion 120b at the end of the rail 120, which brings the lid 14 closer to the base 12 in terms of its displacement towards the closed position.

In Fig. 7, the lid includes reliefs 122 engaged into the rails 120. Of course, it is possible to achieve kinematic inversion and provide the lid with rails and the base of reliefs engaging into the rails while obtaining an equivalent result.

Advantageously, the spraying device 10 is made with a system 130 for unlocking the lid 14, allowing the lid 14 to be separated from the base 12 in order to facilitate placement of the refill in the casing.

The placement of the refill in the casing may further be carried out in certain alternatives without having to separate the lid from the base, by providing a sufficiently wide aperture for introducing the refill into the casing.

In the example illustrated in Figs. 3 and 4, the spray head 22 may be immobilized relatively to the base 12 by a retaining part 140 which for example is mobile relatively to the base 12 between a blocking position illustrated in Fig. 3, where the retaining part 140 ensures holding of the spray head 22 against the vibrating membrane 32, and an unlocked position corresponding to Fig. 4, in which the retaining part 140 releases the spray head 22, in order to allow removal of the refill, and if necessary, its replacement with a refill containing a different product.

The retaining part 140 is for example jointed on the base 12, via a hinge 148, for example around an axis of rotation which is parallel to the X axis, but the retaining part

140 may be mobile otherwise relatively to the base 12 without departing from the scope of the present invention.

Other means for retaining the spray head 22 on the base may further be used, for example a system of slides 155 under which the spray head 22 may be engaged, as
5 illustrated in Fig. 14.

The spraying device 10 advantageously includes an elastic return member 160 which presses the vibrating membrane 32 against the receiving membrane 75, so as to ensure effective transmission of the vibrations of the transducer 30 to the product contained in the spray chamber, as illustrated in Fig. 13.

10 The elastic return member 160 for example is a coil spring which is interposed between the inner face of the vibrating membrane 32 and a bottom wall of the base 12. Alternatively, the elastic return member presses on the transducer or on a supporting wall of the latter. In order to retain the vibrating membrane 32 relatively to the base 12, the latter may be interdependent on a retaining ring 170 which will abut against a wall 175 of
15 the base, which extends around the vibrating membrane 32. When the spray head is in placed on the base 12, the vibrating membrane 32 slightly sinks relatively to the wall 175 of the base 12, as this may be seen in Fig. 13. The force with which the vibrating membrane is applied against the receiving membrane is comprised between 3 and 7 N, for example.

20 Before first use, the spray head 22 may include a removable cap 180 which is attached on the supporting part 55, for example heat-welded on the latter, and which seals the spray head.

The spraying device 10 may include an illumination system which is lit up when the device 10 operates, for example when the casing 11 is open or during spraying.
25 This illumination system may for example generate a halo of light at the spray head 22, notably by diffusing light into the material of the supporting part 55.

In order to use the spraying device 10, the user may start the latter and move the lid 14 relatively to the base 12, which may release a safety device preventing spraying in the case of untimely pressure on the spraying button 25. The user may perfume
30 himself/herself by pressing on the button 25 and by orienting the spraying grid 20 towards the area to be perfumed, the spraying axis Z being in the relevant example perpendicular to the front face of the casing 11. In one alternative, it is the movement of the 14 towards its

open position which automatically activates the device and the user only has to just press the button 25 in order to trigger off the spraying.

Of course, many modifications may be made to the examples which have just been described without departing from the scope of the present invention.

5 The spray head may notably be made otherwise and for example made by assembling two parts in thermoplastic material, one being overmolded on the spraying grid and the other being overmolded on the receiving membrane.

10 In order to make the refill, the spray head 22 may be made and the empty pouch 50 may be assembled with the spray head by ultrasonic welding, the pouch being open at its end opposite to the spray head. The pouch may be filled before closing the pouch by welding, for example ultrasonic welding, along its edge opposite to the spray head.

If necessary, a means for closing the communication between the spray head and the container, notably the pouch, may be provided.

15 In a further alternative, the container may be separated from the spray head and fluid communication may be provided between the container and the spray head by an endpiece system equipped with a valve, which closes the communication when the container is separated from the spray head.

20 If necessary, a means may be provided which ensures sealed closure of the spraying area when the device is left with the lid in the open position. For example, the opening of the lid may be accomplished against the action of an elastic return means, for example a spring, and a lock electrically controlled by the spray head in the case of absence of spraying for a predefined time may release the lid which automatically returns to the closed position under the return action of the elastic means.

25 Alternatively, a micromotor is used for bringing the lid back to the closed position in the absence of prolonged use.

The lid may further be jointed on the base, in the fashion of a telephone with a valve, but opening upwards and not downwards.

30 In a non-illustrated alternative, the device includes a means with which the fluid communication between the container and the spray head may be closed in the absence of use.

For example provision may be made in the refill for a microfluidic valve controllable from the outside of the refill, for example via a magnetic field or electrically. This may further reduce the losses by evaporation in the case of a casing left open and not used.

5 A microfluidic valve mechanically controlled by the device may further be used, for example through a flexible area of the refill or by nipping.

 On the spraying device, a fan may be provided, which allows generation of an air flow which for example promotes diffusion of the sprayed product towards the user or its drying. This fan is for example placed behind the spray head and for example the latter
10 is produced with apertures allowing the air to flow around the spraying area.

 The spraying device may further be produced with a heating means, for example a heating resistor, which may for example facilitate diffusion of certain compounds contained in the product.

 The refill may include a means allowing the fluid communication between the
15 container and the spray head to be interrupted, which opens upon placing the refill in the casing and closes when the refill is removed from the casing, for example by cooperating with a relief of the casing or by being sensitive to a magnetic field generated by the casing, or further by being actuated by an electric voltage provided by the casing.

 The contents of the container may for example range from 1 mL to
20 mL.

 Although a flexible pouch without return of air is preferred, a container in which return of air occurs may be used.

 The actuation button 25 may be a push-in button or with sensitive tripping.

 The spraying device may be produced so as to have several housings for
25 receiving as many respective refills and the device may include selection means, for example one or several buttons, with which the contents of one or more of its cartridges may be selectively sprayed, so as to generate a combination of sprayed substances for example corresponding to scent desired by the user.

 The expression « including one » or “comprising one” should be understood as
30 being synonymous with « including at least one » and “comprising at least one”, unless specified otherwise.

CLAIMS

1. A spraying device (10) comprising:
 - a casing (11) comprising a base (12),
 - 5 - a transducer (30) powered by an electric source (200) and producing vibrations,
 - a container (50) removably received in the casing (11) containing the product to be sprayed,
 - a spray head (22) removably received in the casing, connected through a
 - 10 passage for the product flow to the container, comprising a grid (20) provided with at least one spray orifice and one receiving membrane (75) for receiving vibrations from the transducer and transmitting them to the product present between the grid and the receiving membrane, in order to cause its spraying by the grid,
 - a system for mounting the spray head on the casing, so as to ensure
 - 15 transmission of the vibrations of the transducer to the receiving membrane,
 - a lid (14) guided in displacement relatively to the base (12), between a closed position and an open position, the lid being configured so as to block the spray head (22) in the closed position.
2. The device according to claim 1, the container comprising a flexible pouch
- 20 (50) without return of air, containing the product to be sprayed.
3. The device according to claim 1 or 2, the lid being guided in displacement so as to slide and sliding with a movement for getting closer to the base in the closed position, in order to exert pressure on a sealing surface of the spray head in order to block it sealably.
- 25 4. The device according to any of the preceding claims, the spray head comprising a supporting part (55) overmolded on the grid, assembled with the receiving membrane (75).
5. The device according to any of claims 1 to 4, the head comprising an endpiece (68) on which the container is heat-welded.
- 30 6. The device according to any of the preceding claims, one of the head and of the lid comprising an elastomeric gasket (110) surrounding a spraying area, this gasket being compressed when the lid is in the closed position.

7. The device according to any of the preceding claims, the lid comprising a holding system on the base which is unlockable, so as to be able to completely detach the lid from the base, notably for facilitating placement of the container.

5 8. The device according to any of the preceding claims, the base comprising a housing in which the head may be attached by sliding.

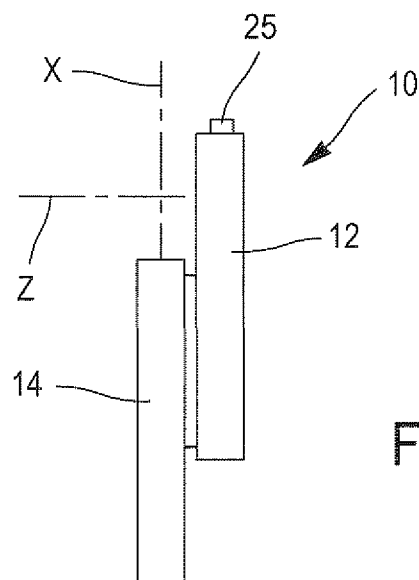
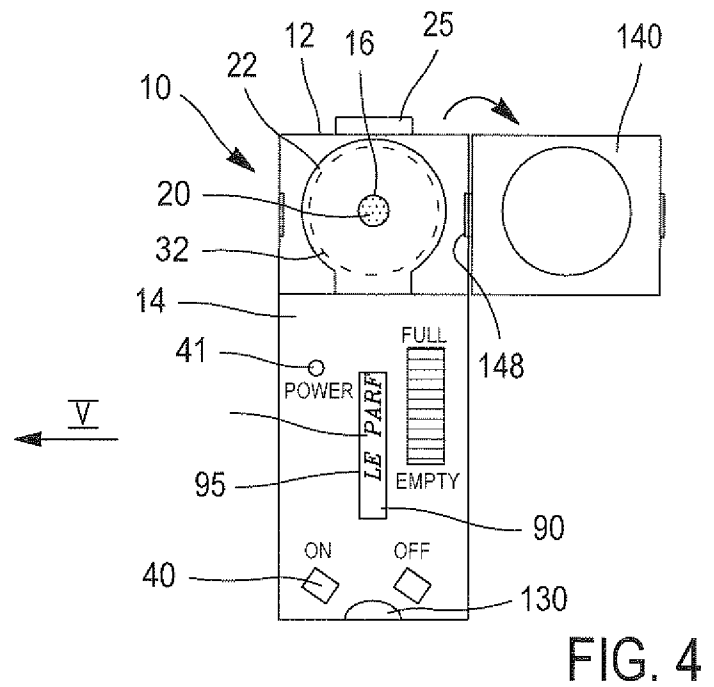
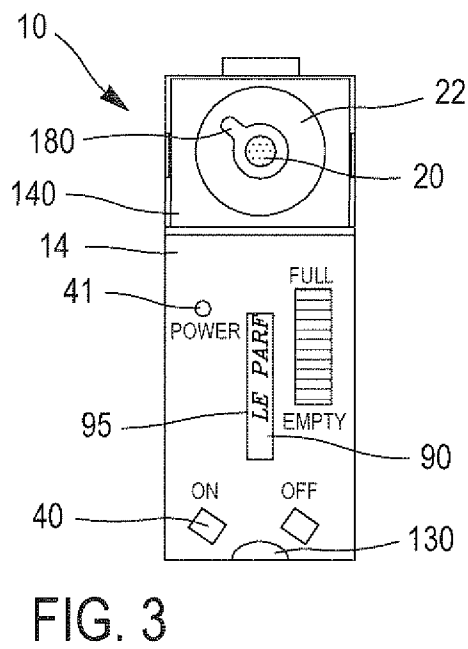
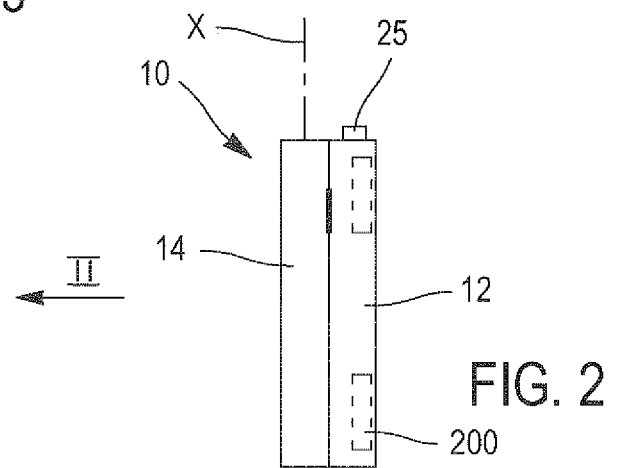
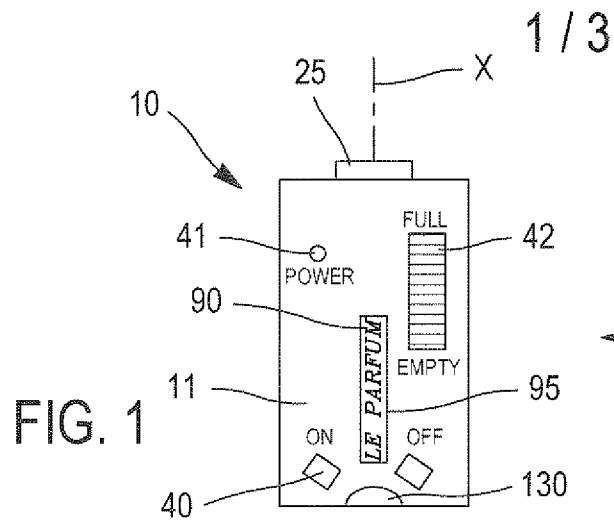
9. The device according to any of claims 1 to 7, comprising a retaining part (140) of the spray head (22), to be pushed back on the latter in order to keep it in place on the base.

10 10. The device according to any of the preceding claims, the communication between the spray head and the container being capillary.

11. The device according to claim 10, comprising a capillary tube (80) extending from the spray head to the inside of the container, notably over the major part of the length of the container.

15 12. The device according to any of the preceding claims, the displacement of the lid (14) towards the open position allowing activation of an electronic circuit (210) for energizing the transducer.

13. The device according to any of the preceding claims, comprising a button (25) for triggering off the spraying.



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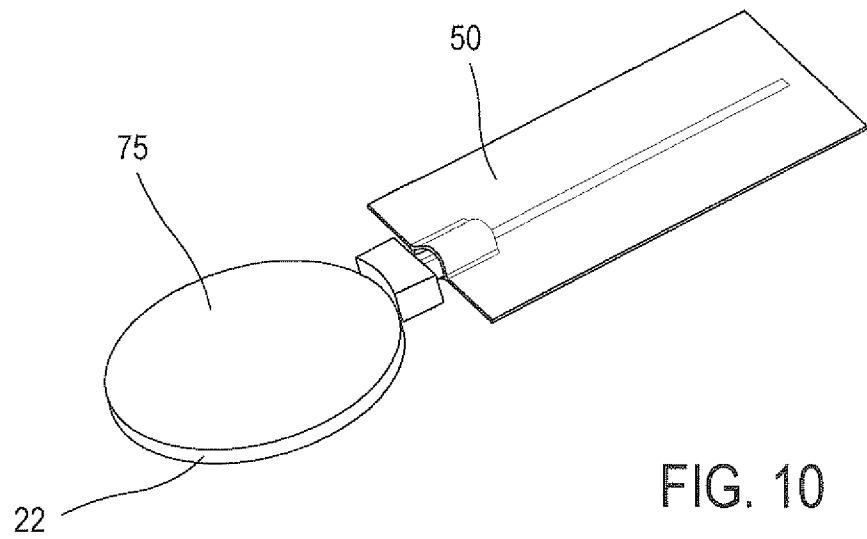


FIG. 10

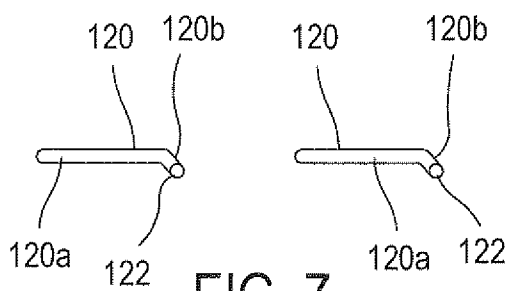


FIG. 7

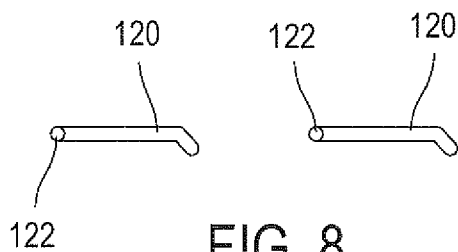


FIG. 8

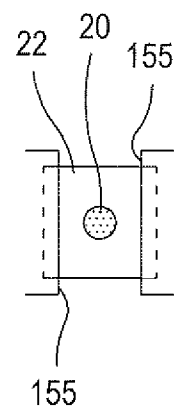


FIG. 14

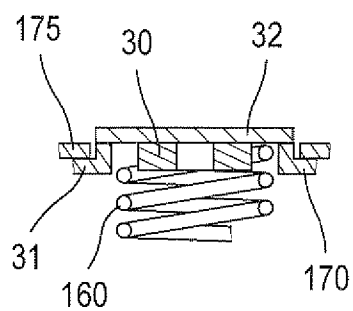


FIG. 12

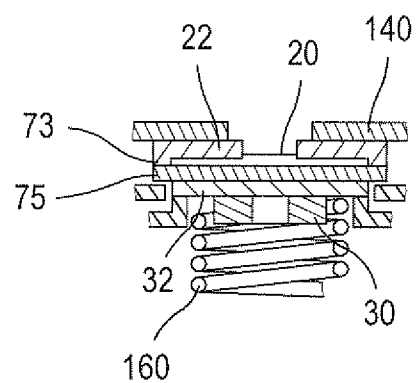
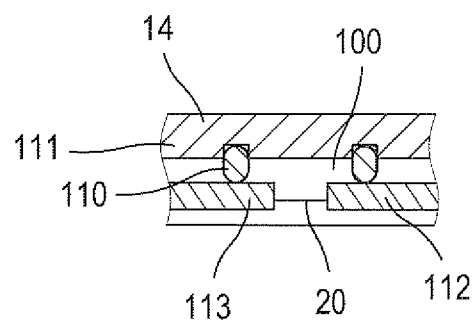
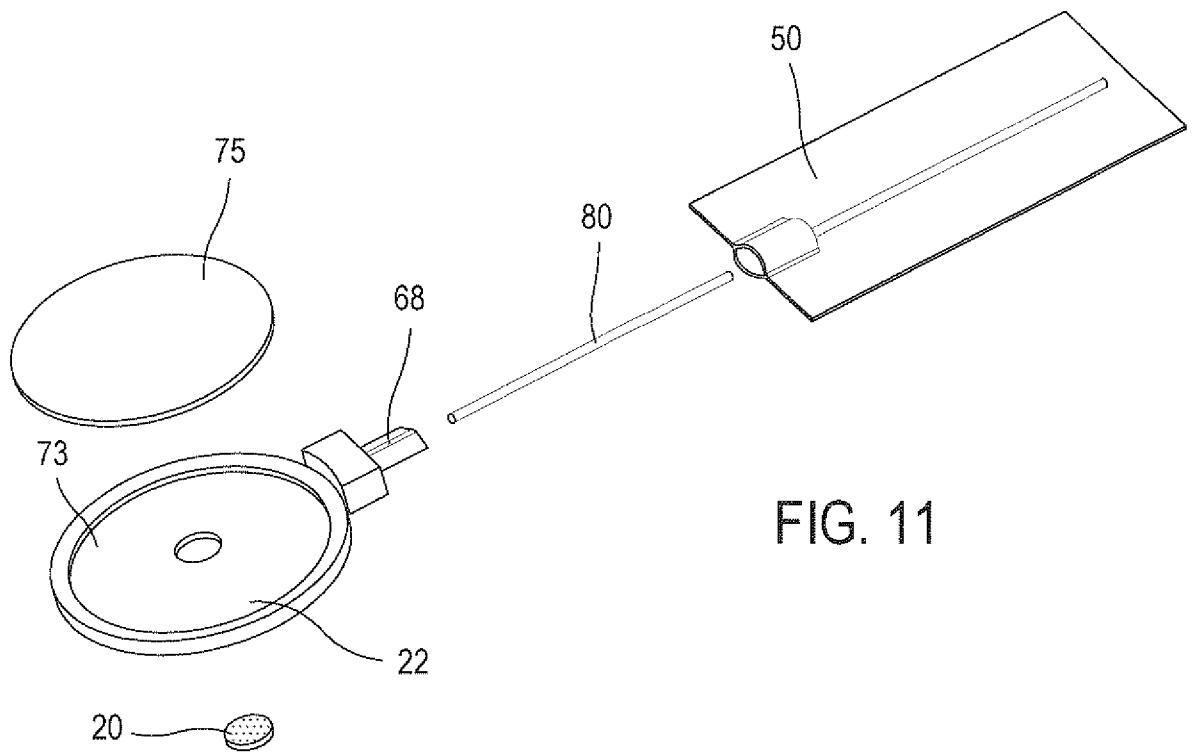
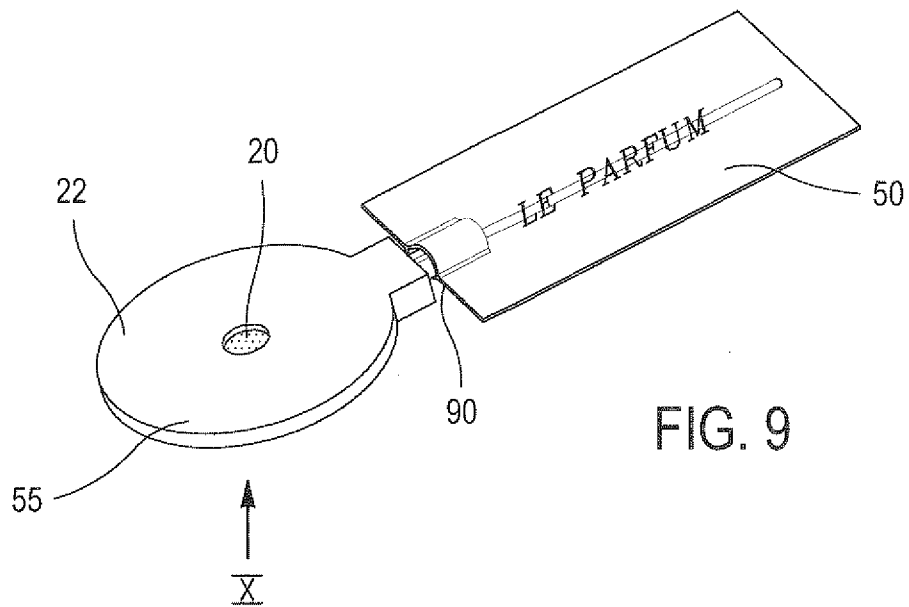


FIG. 13

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INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2009/053824

A. CLASSIFICATION OF SUBJECT MATTER
 INV. A45D34/02 B05B17/06

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)

A45D A61L A61M B05B H04M

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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2006/062408 A1 (CHO WOO-JONG [KR] ET AL) 23 March 2006 (2006-03-23) cited in the application paragraphs [0021] - [0036]; figures	1,2,4-13
Y	US 2007/223746 A1 (PARK, MUN-HWA [KR]) 27 September 2007 (2007-09-27) paragraphs [0042] - [0051]; figures	1,2,4-13
A	EP 1 944 948 A (MATSUSHITA ELECTRIC IND CO LTD [JP]) 16 July 2008 (2008-07-16) paragraphs [0032] - [0040]; figures 9-11	1
A	EP 0 642 802 A (DISETRONIC AG [CH] SIEMENS AG [DE]) 15 March 1995 (1995-03-15) column 2, line 36 - column 4, line 52; figure 1	1

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search

3 November 2009

Date of mailing of the international search report

10/11/2009

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European Patent Office, P.B. 5618 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040,
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Innecken, Axel

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2009/053824

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EP 0642802 A	15-03-1995	CH 686872 A5 DE 59409409 D1 US 5515842 A	31-07-1996 03-08-2000 14-05-1996