(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
27 December 2012 (27.12.2012)

WIPO | PCT

(10) International Publication Number
WO 2012/175984 A1

(51) International Patent Classification:
A61L 9/12 (2006.01) *A61L 9/14* (2006.01)

(21) International Application Number:
PCT/GB2012/051457

(22) International Filing Date:
22 June 2012 (22.06.2012)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
1110690.3 24 June 2011 (24.06.2011) GB

(71) Applicant *(for all designated States except US)*: **RECKITT & COLMAN (OVERSEAS) LIMITED** [GB/GB]; 103-105 Bath Road, Slough, Berkshire SL1 3UH (GB).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **KOONTZ, Richard** [US/GB]; Reckitt Benckiser Healthcare (UK) Limited, Dansom Lane, Hull, Yorkshire HU8 7DS (GB). **NEWTON, Paul** [GB/GB]; Reckitt Benckiser Healthcare (UK) Limited, Dansom Lane, Hull, Yorkshire HU8 7DS (GB). **STEPHENSON, Helen** [GB/GB]; Reckitt Benckiser Healthcare (UK) Limited, Dansom Lane, Hull, Yorkshire HU8 7DS (GB).

(74) Agents: **CARLIN, Robert George** et al.; Reckitt Benckiser Corporate Services Limited, Legal Department - Patents Group, Dansom Lane, Hull, Humberside HU8 7DS (GB).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

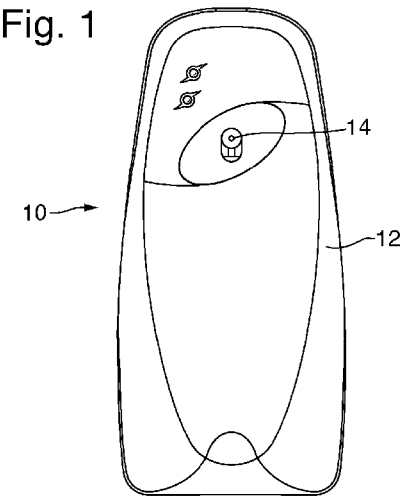
(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

(54) Title: DEVICES AND METHODS FOR EMANATING LIQUIDS

Fig. 1



(57) Abstract: A universal refill of liquid containing one or more active materials is described wherein the refill comprises: a housing; at least one reservoir in the housing for holding the liquid; at least one aperture in the housing wherein the or each aperture is closed by a valve system comprising at least two valves wherein at least one of said valve(s) is configured to be automatically resealable when not being held open and at least one of said valves is provided in the form of an annular ring valve; and wherein the refill is configured to allow the liquid to be extracted by at least two different methods of liquid extraction. Systems comprising emanation devices and universal refills are also described.

WO 2012/175984 A1

Devices and Methods for Emanating Liquids

Field of the Invention

The present invention relates to devices and methods for improved airborne delivery of liquids containing one or more active materials wherein the active material comprises at least one of: a fragrance; an insecticide; a fungicide; a pesticide; a sanitising material; and/or a pharmaceutical.

Background

Liquids, and commonly volatile liquids, containing one or more active materials wherein the active material comprises at least one of: a fragrance; an insecticide; a fungicide; a pesticide; a sanitising material; and/or a pharmaceutical are delivered within the domestic environment via a variety of mechanisms. Devices are available with heaters disposed therein to increase the rate of emanation from a surface saturated with the liquid, such a surface could be a wick saturated with a fragranced liquid and the heater is located adjacent the wick surface and nearby a chimney to heat the liquid on the wick surface and cause it to more readily evaporate and disseminate into the surrounding environment through the chimney.

Alternatively such liquids can be loaded into an aerosol canister wherein the canister holds the liquid under pressure and when a valve is opened the liquid is forced out. The liquid is provided with a propellant which evaporates inside the canister to maintain an even pressure and, outside the canister, assist with the mechanical break up of the liquid by evaporating rapidly. Suitable propellants include volatile hydrocarbons such as propane, butane or isobutane.

Aerosols generally provide a satisfactory spray performance but since they require manual operation by a user, they are not considered to be particularly convenient for routine use.

Automatic aerosol activation devices exist for operation with metered dose aerosols containing a single phase liquid and propellant mixture. These devices are operable to periodically actuate the aerosol to cause a dose of the liquid to be sprayed.

Whilst the automation of the aerosol spraying devices overcomes the problem of manual operation of an aerosol canister, the use of aerosols containing such propellants is becoming increasingly less desirable since these volatile hydrocarbons carry the disadvantage of being flammable, the rising cost of oil is rendering them increasingly expensive and they also carry the further disadvantage of being an atmospheric source of carbon which is deemed to not be environmentally sensitive.

There are other known emanation devices using alternative emanation methodologies such as nebulisation techniques using a piezo-actuated apparatus for instance.

All of the known emanation devices and methodologies of emanation possess advantages and disadvantages with respect to each other that will be appreciated by a person skilled in the art as well as the ultimate end user. However, invariably the consumer is faced with a dilemma when purchasing any particular emanation device as the emanation method employed by the emanation device under consideration is not the only factor the consumer must also consider, the consumer must also consider the availability and range of refills of liquids to be used with said device. In the field of air freshening in particular where the range of fragrances the consumer can select for use with the device is a key point of purchase consideration for the consumer, a small range of fragrances and/or fear that the refill range may not be supported in the long term may affect the consumer's true freedom of choice. The present invention addresses this and other problems.

Summary of Invention

According a first aspect of the present invention there is provided therefore a universal refill of liquid containing one or more active materials wherein the refill comprises:
a housing;
at least one reservoir in the housing for holding the liquid;
at least one aperture in the housing wherein the or each aperture is closed by a valve system comprising at least two valves wherein at least one of said valve(s) is configured to be automatically resealable when not being held open and at least one of said valves is provided in the form of an annular ring valve.

According a second aspect of the present invention there is provided therefore a universal refill containing a liquid for use with at least two different types of emanation device;
wherein the universal refill comprises:
a housing;
at least one reservoir in the housing for holding the liquid;
at least one aperture in the housing wherein the or each aperture is closed by a valve system comprising at least two valves wherein at least one of said valve(s) is configured to be automatically resealable when not being held open and at least one of said valves is provided in the form of an annular ring valve;
and wherein each type of device emanates the liquid from the universal refill via a different mechanism to each other type of emanation device and wherein said at least two different types of emanation device each comprise a chassis configured to receive and releasably retain the universal refill.

According to a third aspect of the present invention there is provided a liquid dispensing system comprising a universal refill of liquid and an emanation device; wherein the refill comprises:
a housing;
at least one reservoir in the housing for holding the liquid;
at least one aperture in the housing wherein the or each aperture is closed by a valve system comprising at least two valves wherein at least one of said valve(s) is configured to be automatically resealable when not being held open and at least one of said valves is provided in the form of an annular ring valve;
and wherein the emanation device is selected from: an emanation device configured to spray the liquid; an emanation device configured to evaporate the liquid by electrically powered means; an emanation device configured to evaporate the liquid by passive, non-electrically powered means; an emanation device configured to emanate the liquid by two or more of spraying the liquid, evaporating the liquid by electrically powered means and/or evaporating the liquid by passive, non-electrically powered means;
characterised in that each emanation device is provided with a chassis configured to receive and releasably retain the universal refill and the universal refill is operationally compatible with each emanation device.

According to a fourth aspect of the present invention there is provided a liquid dispensing system comprising a universal refill of liquid and an emanation device; wherein the refill comprises:
a housing;
at least one reservoir in the housing for holding the liquid;
at least one aperture in the housing wherein the or each aperture is closed by a valve system comprising at least two valves wherein at least one of said valve(s) is configured to be automatically resealable when not being held open and at least one of said valves is provided in the form of an annular ring valve;
and wherein the emanation device is selected from: an emanation device configured to extract the liquid from the refill by pumping the liquid therefrom; an emanation device configured to extract the liquid from the refill by blowing the liquid therefrom; an emanation device configured to extract the liquid from the refill by wicking the liquid therefrom; an emanation device configured to extract the liquid from the refill by capillary action therefrom; an emanation device configured to extract the liquid from the refill by a gravity feed therefrom; an emanation device configured to extract the liquid from the refill by two or more ways selected from pumping, blowing, wicking, capillary action and/or gravity feed therefrom;
characterised in that each emanation device is provided with a chassis configured to receive and releasably retain the universal refill and the universal refill is operationally compatible with each emanation device.

Within the context of the present invention the term “operationally compatible” is to be understood to require that the refill can be received within the chassis of an emanation device and permit the device to extract the liquid from the refill and emanate same into the surrounding environment.

According to a fifth aspect of the present invention there is provided a liquid dispensing device for use with a universal refill of liquid and an emanation device; wherein the refill comprises:
a housing;
at least one reservoir in the housing for holding the liquid;
at least one aperture in the housing wherein the or each aperture is closed by a valve system comprising at least two valves wherein at least one of said valve(s) is configured to be automatically resealable when not being held open and at least one of said valves is provided in the form of an annular ring valve;
wherein the emanation device is selected from: an emanation device configured to extract the liquid from the refill by pumping the liquid therefrom; an emanation device configured to extract the liquid from the refill by blowing the liquid therefrom; an emanation device configured to extract the liquid from the refill by wicking the liquid therefrom; an emanation device configured to extract the liquid from the refill by capillary action therefrom; an emanation device configured to extract the liquid from the refill by a gravity feed therefrom; an emanation device configured to extract the liquid from the refill by two or more ways selected from pumping, blowing, wicking, capillary action and/or gravity feed therefrom;
characterised in that each emanation device is provided with a chassis configured to receive and releasably retain the universal refill.

Preferably the universal refill is provided with securing means which are configured, in use, to cooperate with the chassis and/or the emanation device to permit secure engagement therewith. Preferably the securing means form a part of the external surface of the housing.

The automatically resealable valve(s) may be provided by a self-sealing liquid-tight valve, such as a rubber, rubberised, silicone slit or cross valve or the like, wherein the valve tends toward a closed position when not being held open. Alternatively or additionally the automatically resealable valve(s) may be provided by a sealing means biased into a closed position by a deformable biasing means such as a spring means or the like.

The valve(s) provided as an annular ring are preferably an open ring that is not able to prevent fluid flow therethrough. Preferably the annular ring is supported on a flexible annular skirt. The opening in the annular ring is preferably provided with a diameter of between 0.1 – 20.0mm, and more preferably with a diameter of between 3.0 – 15.0mm, and even more preferably with a diameter of between 4.0 – 10.0mm, and most preferably with a diameter of between 5.0 – 7.0mm. Whilst the annular ring is preferably provided in a circular shape other shapes may be permissible providing the shape is capable of performing the sealing function required of it, such shapes include substantially circular shapes, oval shapes, diamond shapes and such like.

The automatically resealable valve(s) and the annular ring valve(s) are preferably provided substantially adjacent to each other. Preferably the automatically resealable valve(s) is a downstream valve (i.e. the valve closest to the reservoir) and the annular ring valve(s) is an upstream valve. In one preferred embodiment the downstream valve and the upstream valve are formed as separate pieces that are held adjacent but spaced apart from each other. In a most preferred embodiment however the downstream valve and the upstream valve are formed as a one piece component.

In a most preferred embodiment the refill is provided with a single aperture closed by a valve system comprising two valves wherein one of said valves is configured to be automatically resealable when not being held open and the other of said valves is provided in the form of an annular ring valve.

In this preferred arrangement the downstream valve is operable to prevent any liquid within the refill from escaping until the downstream valve is opened and the upstream valve is operable to sealingly engage with liquid extraction means that are part of the emanation device which enter the refill to open a liquid pathway from the refill into the device. In this arrangement the downstream and upstream valves cooperate in that the downstream valve does not need to be optimised to seal against the liquid extraction means that open the valve as the upstream valve can be configured to undertake that task and, vice versa, the upstream valve need not be optimised to form a liquid-tight seal as the downstream seal can be optimised for that task. Furthermore, the open appearance of the upstream valve provides a user with a visual cue to aim either the liquid extraction means from the emanation device or use as a guide when loading the refill onto said means.

Preferably the universal refill is provided with one or more diptubes therein.

The universal refill is preferably formed with a housing of rigid or substantially rigid material. Such an arrangement may be advantageous as differing forms of extraction of liquid therefrom may put different strains and pressures on the refill and by providing the housing of the refill in a rigid or substantially rigid material, the refill may be better able to resist those differing strains and pressures to deliver uniform and/or predictable characteristics.

The refill housing is preferably shaped such that a user may only able to engage the refill with a chassis in a single orientation. For instance, if the refill was generally cylindrical with the valve system(s) being provided on the circular end of the cylinder, a user could load the circular end into the chassis in various orientations which may prevent ease of engagement of the refill therein, whereas if the face of the refill containing the valve system(s) was, for instance, rhomboidal then the user would be presented with only a single option for orienting the refill in the chassis.

Alternatively, the refill housing may be shaped such that a user may ostensibly be presented with more than one orientation in which they could engage the refill with a chassis and in this arrangement the chassis is preferably provided with guide means which cooperate with features of the refill housing to ensure that the refill can only be engaged with the chassis in a single orientation such that efforts by the user to incorrectly load the refill in the chassis will be resisted thereby.

The universal refill is preferably provided with a single reservoir. The presence of a diptube may be advantageous as this may better optimise the ability of the universal refill to operate in a number of different orientations when engaged with the chassis of an emanation device. The diptube may be connected to the valve system or may be held adjacent to the valve system by mounting fixed within the refill.

The reservoir(s) may be provided in the form of a flexible bag which is capable of collapsing inwardly as liquid is extracted therefrom.

The refill may be provided with one or more vent holes in the refill housing which are formed to permit air to enter the reservoir(s) when liquid is removed therefrom but not to permit the liquid to escape therethrough. The vent hole(s) may be covered with a gas permeable membrane. Alternatively the vent hole(s) may be covered with an automatically resealable means which engages with a seal opening means of the chassis. Preferably however, the vent hole(s) are preferably sized such that the liquid may not escape therefrom or that the rate of escape would be sufficiently low as to not be relevant for the safe operation of the refill in an emanation device.

The refill housing is preferably provided with a section thereof adjacent the reservoir(s) that is substantially transparent to permit a user to easily determine what type of liquid is held therein and/or the level of said liquid.

The chassis may be formed as a separate component to the emanation device and may be mounted on or in the device to receive and releasably retain the universal refill. Alternatively or additionally, the chassis may be formed in an exterior surface of the emanation device (such as a device housing). Alternatively or additionally the chassis may be formed within the interior of the device and a suitably shaped aperture is provided to permit access to the interior of the housing by the universal refill. Alternatively or additionally the chassis may be formed within the interior of the device and the device is provided with a door which may be opened to permit access to the interior of the housing by the universal refill.

Where the emanation device is to pump the liquid from the reservoir(s) of the universal refill the emanation device may be provided with one or more liquid conduits that are connected at one end to a pumping means housed within the device and open at the other end to contact the liquid. The liquid conduit(s) are preferably sized to extend through the, or each, valve system in the universal refill and into the reservoir(s) therewithin when the refill is engaged with the chassis. In use, the pump may be operable via conventional pumping mechanisms to create negative pressure within the liquid conduit(s) in order to draw the liquid into the conduit(s) and transport same toward the pump. Once the liquid is in the device it may be emanated therefrom in any of a number of convention mechanisms, for instance the pumped liquid may be transported to an open emanation plate in combination with a heater to promote evaporation of the liquid, or the liquid may be transported to a nebuliser and it is atomised thereby, etc.

Where the emanation device is to blow the liquid from the reservoir(s) of the universal refill the emanation device may be provided with one or more blown air conduits that are connected at one end to a blowing means housed within the device and open at the other end to permit blown air to exit therefrom and with one or more liquid conduits that are open at one end to contact the liquid and connected to the device at the other end. The blown air conduit(s) are preferably sized to enter through one valve system of the universal refill and the liquid conduit(s) are preferably sized to extend through one or more of alternate valve systems in the refill (i.e.- the blown air conduit(s) and the liquid conduit(s) do not use the same valve system) and wherein both types of conduits extend into the reservoir(s) within the refill when said refill is engaged with the chassis. In use, the blowing means may be operable to blow air along the blown air conduit and into the reservoir(s) in order to pressurise the head space (i.e. – the head space is the space within the reservoir(s) not taken up by the liquid) and, when required by the device, force liquid into the liquid conduit(s) and toward the device. liquid transported along the liquid conduit(s) may be emanated therefrom in any of a number of convention mechanisms, for instance the liquid may be sprayed directly from the device under the force of said transportation and/or in combination with additional blown air from the blowing means, the liquid may be transported to a nebuliser and for it to be atomised thereby, etc.

Alternatively, where the universal refill is provided with a single aperture and single valve system, the blown air conduit and liquid conduit could be integrated such that the blown air conduit extends along a central core of the liquid conduit with the blown air conduit being provided with the greater length such that it can extend further into the refill and such that the conduits can enter the single aperture and valve system; the blown air conduit could be adjacent the liquid conduit however. In this arrangement the blown air conduit may act as described above by blowing air into the headspace of the refill to force liquid into the liquid conduit and into the device for emanation therefrom. As a further alternative, an integrated conduit can be provided with one conduit extending along a central core of the other conduit such that the conduits can both enter a single aperture and valve system, wherein the one conduit is a liquid conduit

which has air blown across the top thereof to draw the liquid along the conduit via the Venturi effect and/or capillary effect, whilst the other conduit allows air to be returned to the reservoir to prevent choking of the liquid flow.

Where the emanation device is to wick the liquid from the reservoir(s) of the universal refill the emanation device may be provided with one or more wicks that are connected at one end to the emanation device and configured at the other end to contact the liquid and uptake same. The wick(s) are preferably sized to extend through the valve system(s) in the universal refill and into the reservoir(s) therewithin when the refill is engaged with the chassis. In use, the wick(s) may be operable to passively uptake liquid from the reservoir(s) and transport same towards the other end of the wick(s). Once the liquid is within the wick(s) may be emanated from the device in any of a number of convention mechanisms, for instance the liquid may be emanated directly from the wick(s) passively and/or in combination with powered means to assist in the evaporation such as an electrically powered heater, or the liquid may be transported to along the wick(s) to a nebuliser and it is atomised thereby, etc.

Where the emanation device is to transport the liquid from the reservoir(s) of the universal refill to the emanation device via capillary action the device may be provided with one or more capillary tubes that are connected at one end to the emanation device and configured at the other end to contact the liquid and uptake same. The capillary tube(s) are preferably sized to extend through the valve system(s) in the universal refill and into the reservoir(s) therewithin when the refill is engaged with the chassis. In use, the capillary tube (s) may be operable to passively uptake liquid from the reservoir(s) and transport same towards the other end of the tube(s). liquid transported along the capillary tube(s) to the emanation device may then be emanated therefrom in any of a number of convention mechanisms, for instance the liquid may be transported to an open emanation plate in combination with a heater to promote evaporation of the liquid, or the liquid may be transported to a nebuliser and it is atomised thereby, etc.

Where the emanation device is to extract the liquid from the reservoir(s) of the universal refill toward the emanation device by a gravity feed mechanism the emanation device may be provided with one or more liquid conduits that are connected at one end to the device and open at the other end to contact the liquid. The liquid conduit(s) are preferably sized to extend through the valve system(s) in the universal refill and into the reservoir(s) therewithin when the refill is engaged with the chassis. The chassis is orientated such when the universal refill is engaged therewith the valve system(s) of the refill are located closer to a supporting surface on which the device is held such that once the valve(s) are opened by the liquid conduit(s) the force of gravity will cause liquid to travel from the refill toward the device. In use, the liquid conduit(s) may be operable to simply open the valve system(s) to permit the liquid to flow from the reservoir toward the device to emanate the liquid by any of a number of convention emanation mechanisms, for instance the liquid flow into an open emanation plate in combination with a heater to

promote evaporation of the liquid, or the liquid may flow toward a nebuliser for it to be atomised thereby, etc.

The emanation device and/or chassis may be provided with securing means which are configured to engage with the universal refill to permit a secure engagement of the universal refill to the chassis. Preferably the releasable engagement between the universal refill and the chassis is provided with a positive feedback for the user; such as a “push-click” mechanism wherein the user pushes the refill against the chassis until an audible “click” sound is achieved and the refill is secured relative to the chassis, and to disengage the universal refill from the chassis the user pushes the refill against the chassis until a further “click” sound is achieved accompanied by a physical sensation of the refill being pushed away from the chassis and the user may separate the refill from the device.

The universal refill and emanation devices are preferably provided with a device-to-refill recognition system whereby the device is able to recognise the level of liquid remaining in the refill and/or the type of liquid in the refill and/or whether the refill is from a known source. The recognition system may be provided by the device possessing a physical characteristic in the refill housing which interacts with a portion of the chassis and/or device. The recognition system may comprise a moulded feature in the reservoir(s) which may have a communication component embedded therein which can communicate with a corresponding communication component within the device and/or the moulded feature may act as a convenient means to for the device to make reference against when determining the level of liquid in the reservoir(s). The recognition system may be provided with an identification means being applied to and/or in the refill housing such as a visual code, an RFID tag, printed electrical components, magnets or the like. The recognition system may be provided by any combination of the aforesaid recognition systems.

Any of the features described herein may be combined with any of the above aspects in any combination.

Brief Description of the Drawings

Embodiments of the invention will now be described, by way of example only, with reference to the following drawings in which:

Fig. 1 illustrates a prior art automatic aerosol emanation device;

Fig. 2 illustrates a spraying emanation device suitable for use with a universal refill according to the present invention;

Fig. 3 illustrates a universal refill according to the present invention; and

Fig.4 illustrates a sectional view of the universal refill of the present invention.

Description of an Embodiment

Fig.1 illustrates a well known battery-operated automatic aerosol emanation device (10). The device (10) comprises a housing 12 which supports a platform (not shown) in the interior of the device (10). The platform, in turn, supports and retains an aerosol canister of pressurised fluid (not shown), specifically, air freshening fluid comprising various components including fragrance, solvent and propellant. The housing 12 also supports an actuation means (not shown), which is sprayed from the aerosol canister by an arm of the actuation mean bearing against a spray head (14) of the aerosol canister to move it in a generally downward direction until the spray head is depressed and the valve within the aerosol is opened, thus, causing a quantity of fluid to be sprayed therefrom. For this sort of arrangement it would be preferable for the aerosol canister to contain a single phase formulation so that the aerosol can be of a metered dose arrangement.
Alternatively, although not shown the prior art device (10) could be provided with actuation means which take the form of a valve system, such as a solenoid valve system. In such an arrangement the aerosol canister would be provided without a spray head, rather the valve stem of the aerosol canister would engage directly with the solenoid valve system of the device. In this arrangement rather than the actuation means initiating actuation by movement of an arm, the solenoid valve would be energised to initiate the release of a quantity of fluid from the aerosol.

For these two well known types of prior art devices that work in ostensibly the same way, by spraying, ostensibly with the same refill, a single phase aerosol formulation provided in an aerosol canister, they require different refills which poses a series of dilemmas to the end consumer/user, such dilemmas include availability of refills, the range of refills, the value perception/consumer benefit of one particular device and refill range versus a different device and refill, etc. Similar dilemmas face the retailer, how much shelf space can they a lot to one range of devices and refills, does the amount of shelf space necessarily limit the different varieties of that specific refill they can retail which in turn affects the end consumer/user's decision to purchase and re-purchase, etc.

Fig.2 shows an emanation device (20) of the present invention which has a similar general appearance to a known prior art device (10) but differs in several important details. The emanation device (20) has a housing (22) and an aperture (24) through which, in use, liquid may be emanated. However, the device (20) has a chassis (26) formed integrally with a front face of the housing (22) to provide a recess of suitable dimensions to receive a universal refill (30). The chassis (26) is provided with a conduit (28) which protrudes within the interior of the chassis (26). The conduit (28) is operatively connected to emanation means (not shown) within the device (20) and this will be discussed in greater detail below.

Fig.3 shows a universal refill (30). The refill (30) comprises a housing (32) which is made, preferably, of a rigid material such as a hardened plastics material or the like. The housing has a viewing window (34) to

the reservoir of the refill which allows a visual check on the level of liquid held therein. A valve system (36) is provided in one end of the housing, the valve system will be described with reference to Fig.4.

Fig.4 shows a sectional view of the refill (30) with the valve system (36) sitting within an aperture (38) of the housing. The valve system (38) comprises an open annular ring valve (40) suspended by a flexible annular skirt (42) which forms the upstream valve and the valve system further comprises a downstream valve in the form of a rubberised slit valve (44). The downstream slit valve 44 provides a fluid tight closure to prevent the liquid in the reservoir from escaping.

A dispensing system of the present invention is created by a user locating the refill (30) such that the end of the refill containing the valve (36) is facing the chassis (26) of the device (20). The user then pushes the refill (30) into the chassis (26) and by doing so forces the conduit (28) into the valve (36) and, specifically, past the annular ring (40) which is sized to create a fluid-tight seal against the conduit (28) and into or past the slit valve (44) to open same. The opening of the slit valve (44) by the conduit (28) would correspond with the refill being secured against securing means (not shown) in the device, a user would understand when the securing means had been engaged due to positive feedback is received in the form of an audible click.

The end of the housing containing the valve (36) is substantially square in shape and guide means (not shown) in the chassis would cooperate with grooves in the refill housing (not shown) to ensure that the refill could only be engaged with the chassis if conduit (28) is correctly aligned to open valve (36). Although not illustrated, the end of the refill housing containing the valve (36) could be shaped such that the loading thereof into the chassis (26) was only possible via a single orientation of that end of the refill.

Emanation device (20) is arranged to spray the liquid out of the aperture (24) and it does this by blowing liquid from the refill (30). Specifically, the conduit (28) comprises an integrated blown air conduit (not shown) that extends along a central core of a liquid conduit (not shown) with the blown air conduit being provided with the greater length such that it can extend further into the refill. In use the blown air conduit blows air into the refill (30) and the liquid conduit is arranged to extract liquid from the refill (30). An air pump (not shown) in the device (20) blows air along the blown air conduit and into the reservoir of the refill (30) in order to pressurise the head space (i.e. – the head space is the space within the reservoir(s) not taken up by the liquid), this increase in internal pressure forces the liquid into the liquid conduit through which the liquid is transported into the device (20). Once the liquid is in the device the force of the transportation from the refill in combination with additional blown air from the air pump causes the liquid to be forced toward a spray nozzle (25) which consists of a series of perforations which assist in the mechanical break up of the liquid as it passes therethrough to result in a fine spray of particles of liquid.

After a period of spraying of the liquid from the refill (30) by the emanation device (20), the user may remove the refill (30) from the chassis (26). The user does this by pushing the refill against the positive feedback mechanism of the securing means until an audible click is heard again by the user signifying the release by the securing means of the refill thus permitting the refill (26) to be freely removable from the chassis (26) by the user.

The user is then able to re-use refill (30) is a different device (not shown) which extracts and emanates the liquid via a different mechanism to that of spraying emanation device (20), this may be beneficial if the different device is located in a different location where the user wishes to create a different atmosphere. For instance, where the liquid is an air freshener, the spraying emanation device (20) may be located in the kitchen of a user's home for the instantaneous targeting of cooking smells as required by the user, whereas in the lounge of the user's home, the user would prefer to create a background ambience of fragrance rather than target unwanted odours. In this proposed situation, a user may take partially used refill (30) and load it into the chassis of a different emanation device (not shown) which extracts the liquid from the refill (30) passively.

The different emanation device (not shown) may have the same appearance as spraying emanation device (20), however, the conduit of the emanation device would possess a rigid outer surface and an inner core of porous material. As the user engages the refill (30) with the conduit, the rigid outer surface opens the valve (36) thus allowing the liquid to contact the inner porous core of the conduits. The core of the conduits is then able to passively wick the liquid into the device toward an emanation substrate of porous material adjacent a heater mounted in the device. The heater is operable to gently heat the emanation substrate to promote the evaporation of the liquid therefrom to create a constant and slow emanation of the atomised liquid into the surrounding environment.

A further different emanation device (not shown) may have a similar appearance as spraying emanation device (20), however, the chassis of the device would be arranged to hold the refill (30) in an inverted orientation such that the aperture is orientated in an at least partially downward direction, but preferably directly downward direction. The conduit of the emanation device would possess an outer surface surrounding an outer conduit and an inner conduit of greater length. After the user engages the refill (30) with the chassis, the inner conduit is located near the end of the refill remote from the aperture and the outer conduit surrounding the inner conduit has an opening thereto nearer the aperture. Gravity allows the liquid to enter the outer conduit and feed into the device for emanation, air is permitted to travel via the inner conduit into the reservoir to prevent the flow of liquid from the refill into the device from choking.

All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

Each feature disclosed in this specification (including any accompanying claims, abstract and drawings) may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

Claims

1. A universal refill of liquid containing one or more active materials wherein the refill comprises:
a housing;
at least one reservoir in the housing for holding the liquid;
at least one aperture in the housing wherein the or each aperture is closed by a valve system comprising at least two valves wherein at least one of said valve(s) is configured to be automatically resealable when not being held open and at least one of said valves is provided in the form of an annular ring valve.

2. A universal refill containing a liquid for use with at least two different types of emanation device; wherein the universal refill comprises
a housing;
at least one reservoir in the housing for holding the liquid;
at least one aperture in the housing wherein the or each aperture is closed by a valve system comprising at least two valves wherein at least one of said valve(s) is configured to be automatically resealable when not being held open and at least one of said valves is provided in the form of an annular ring valve;
and wherein each type of device emanates the liquid from the universal refill via a different mechanism to each other type of emanation device and wherein said at least two different types of emanation device each comprise a chassis configured to receive and releasably retain the universal refill.

3. A universal refill according to claim 1 or claim 2, wherein the automatically resealable valve(s) is provided by a self-sealing liquid-tight valve, and wherein the valve tends toward a closed position when not being held open.

4. A universal refill according to claim 1 or claim 2, wherein the automatically resealable valve(s) is provided by a sealing means biased into a closed position by a deformable biasing means.

5. A universal refill according to any preceding claim, wherein the valve(s) provided as an annular ring is an open ring that is not able to prevent fluid flow therethrough.

6. A universal refill according to any preceding claim, wherein the annular ring is supported on a flexible annular skirt.

7. A universal refill according to claim 5, wherein the opening in the annular ring is provided with a diameter of between 0.1 – 20.0mm, and more preferably with a diameter of between 3.0 – 15.0mm, and even more preferably with a diameter of between 4.0 – 10.0mm, and most preferably with a diameter of between 5.0 – 7.0mm.

8. A universal refill according to any preceding claim, wherein the automatically resealable valve(s) and the annular ring valve(s) are provided substantially adjacent to each other.

9. A universal refill according to any preceding claim, wherein the automatically resealable valve(s) is a downstream valve (i.e. the valve closest to the reservoir) and the annular ring valve(s) is an upstream valve.

10. A universal refill according to claim 8 or claim 9, wherein the downstream valve and the upstream valve are formed as separate pieces that are held adjacent but spaced apart from each other.

11. A universal refill according to claim 8 or claim 9, wherein the downstream valve and the upstream valve are formed as a one piece component.

12. A universal refill according to any preceding claim, wherein the refill is provided with a single aperture closed by a valve system comprising two valves wherein one of said valves is configured to be automatically resealable when not being held open and the other of said valves is provided in the form of an annular ring valve.

13. A universal refill according to any preceding claim, wherein the refill is formed with a housing of rigid or substantially rigid material.

14. A universal refill according to any preceding claim, wherein the refill housing is shaped such that a user may only may able to engage the refill with a chassis in a single orientation.

15. A universal refill according to any preceding claim, wherein the refill is provided with a single reservoir.

16. A universal refill according to any preceding claim, wherein the refill is provided with one or more vent holes in the refill housing.

17. A universal refill according to any preceding claim, wherein the housing is provided with a section thereof adjacent the reservoir(s) that is substantially transparent.

18. A liquid dispensing system comprising a universal refill of liquid and an emanation device; wherein the refill comprises:
a housing;
at least one reservoir in the housing for holding the liquid;

at least one aperture in the housing wherein the or each aperture is closed by a valve system comprising at least two valves wherein at least one of said valve(s) is configured to be automatically resealable when not being held open and at least one of said valves is provided in the form of an annular ring valve; and wherein the emanation device is selected from: an emanation device configured to spray the liquid; an emanation device configured to evaporate the liquid by electrically powered means; an emanation device configured to evaporate the liquid by passive, non-electrically powered means; an emanation device configured to emanate the liquid by two or more of spraying the liquid, evaporating the liquid by electrically powered means and/or evaporating the liquid by passive, non-electrically powered means; characterised in that each emanation device is provided with a chassis configured to receive and releasably retain the universal refill and the universal refill is operationally compatible with each emanation device.

19. A liquid dispensing system comprising a universal refill of liquid and an emanation device; wherein the refill comprises:
a housing;
at least one reservoir in the housing for holding the liquid;
at least one aperture in the housing wherein the or each aperture is closed by a valve system comprising at least two valves wherein at least one of said valve(s) is configured to be automatically resealable when not being held open and at least one of said valves is provided in the form of an annular ring valve; and wherein the emanation device is selected from: an emanation device configured to extract the liquid from the refill by pumping the liquid therefrom; an emanation device configured to extract the liquid from the refill by blowing the liquid therefrom; an emanation device configured to extract the liquid from the refill by wicking the liquid therefrom; an emanation device configured to extract the liquid from the refill by capillary action therefrom; an emanation device configured to extract the liquid from the refill by a gravity feed therefrom; an emanation device configured to extract the liquid from the refill by two or more ways selected from pumping, blowing, wicking, capillary action and/or gravity feed therefrom; characterised in that each emanation device is provided with a chassis configured to receive and releasably retain the universal refill and the universal refill is operationally compatible with each emanation device.

20. A liquid dispensing device for use with a universal refill of liquid and an emanation device; wherein the refill comprises:
a housing;
at least one reservoir in the housing for holding the liquid;
at least one aperture in the housing wherein the or each aperture is closed by a valve system comprising at least two valves wherein at least one of said valve(s) is configured to be automatically resealable when not being held open and at least one of said valves is provided in the form of an annular ring valve;

wherein the emanation device is selected from: an emanation device configured to extract the liquid from the refill by pumping the liquid therefrom; an emanation device configured to extract the liquid from the refill by blowing the liquid therefrom; an emanation device configured to extract the liquid from the refill by wicking the liquid therefrom; an emanation device configured to extract the liquid from the refill by capillary action therefrom; an emanation device configured to extract the liquid from the refill by a gravity feed therefrom; an emanation device configured to extract the liquid from the refill by two or more ways selected from pumping, blowing, wicking, capillary action and/or gravity feed therefrom; characterised in that each emanation device is provided with a chassis configured to receive and releasably retain the universal refill.

Fig. 1

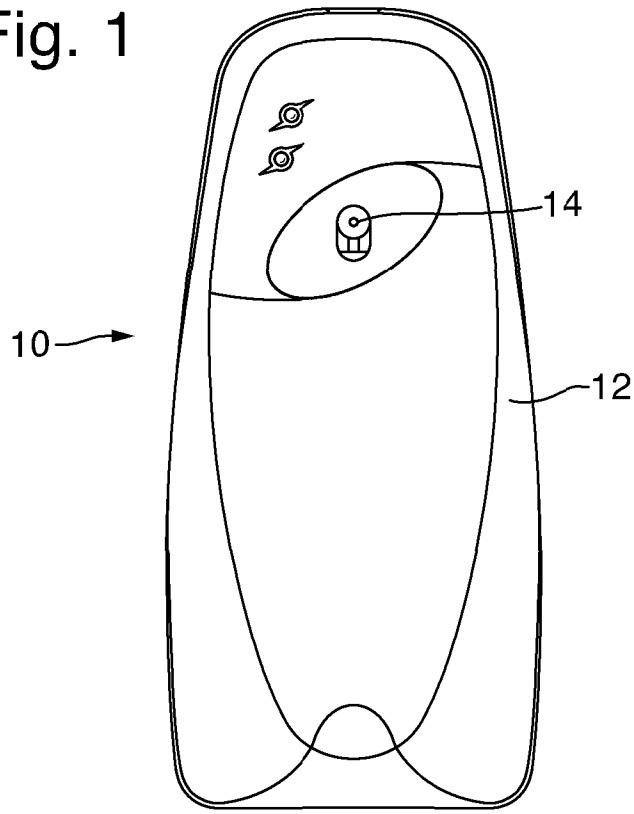


Fig. 2

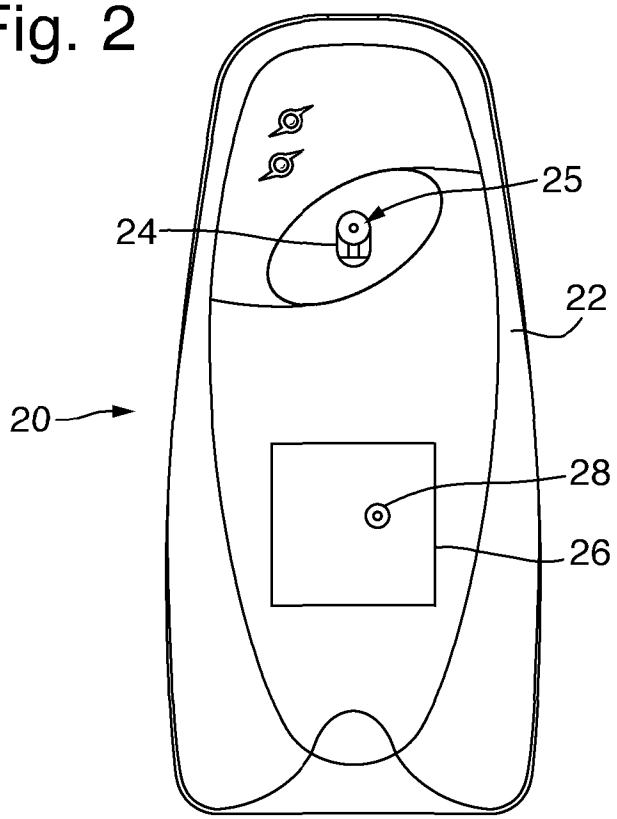


Fig. 3

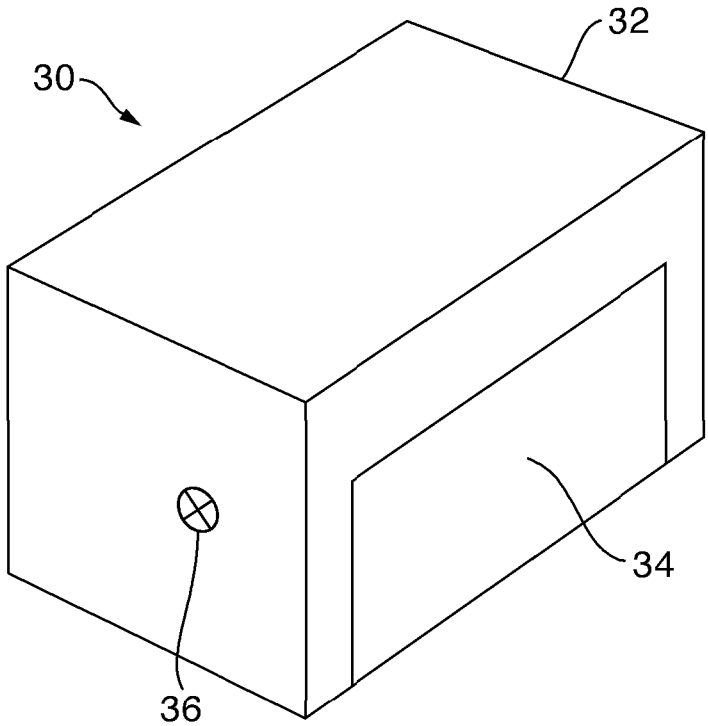
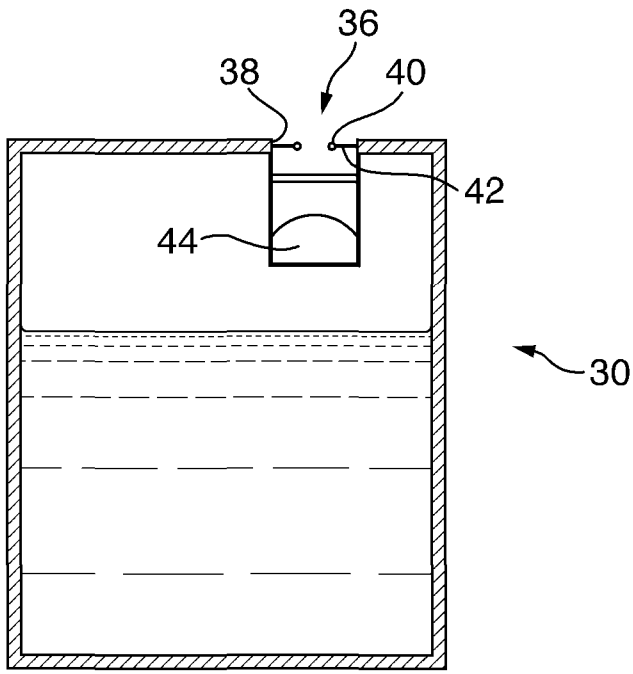


Fig. 4



INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2012/051457

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61L9/12 A61L9/14
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)
A61L

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	US 2010/243754 A1 (HARRIS ROBERT M [US]) 30 September 2010 (2010-09-30) abstract; figures paragraphs [0040], [0066], [0073], [0074], [0079], [0080]	1-20
A	EP 1 076 014 A2 (JOHNSON & SON INC S C [US]) 14 February 2001 (2001-02-14) abstract; figures paragraph [0019]	1-20
A	US 2008/149665 A1 (HAFER KEVIN [US] ET AL) 26 June 2008 (2008-06-26) figures	1

-/--

[X] Further documents are listed in the continuation of Box C.

[X] 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 application or patent 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

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"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

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
2 October 2012	11/10/2012

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

1

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2012/051457

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2008/034977 A2 (EUROP COSMETICS [FR]; CORDA ALAIN [FR]) 27 March 2008 (2008-03-27) figure 19	1
A,P	WO 2012/001405 A1 (RECKITT & COLMAN OVERSEAS [GB]; INGLEDEW NATALIE [GB]; MAROUSE LOIC [G) 5 January 2012 (2012-01-05) the whole document	1-20
A,P	WO 2012/059771 A1 (RECKITT & COLMAN OVERSEAS [GB]; BARLOW LOUISE MARGARET [GB]; PIERCY EL) 10 May 2012 (2012-05-10) the whole document	1-20

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/GB2012/051457

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010243754 A1	30-09-2010	NONE	
EP 1076014 A2	14-02-2001	AR 027838 A1	16-04-2003
		AT 285958 T	15-01-2005
		AT 365136 T	15-07-2007
		BE 1013415 A5	04-12-2001
		BE 1014156 A3	06-05-2003
		CA 2314210 A1	10-02-2001
		CA 2576101 A1	10-02-2001
		CN 1283527 A	14-02-2001
		CN 1550424 A	01-12-2004
		DE 10034300 A1	22-02-2001
		DE 60017028 D1	03-02-2005
		DE 60017028 T2	02-06-2005
		DE 60035297 T2	27-09-2007
		EP 1076014 A2	14-02-2001
		ES 2228183 A1	01-04-2005
		FR 2797434 A1	16-02-2001
		FR 2802902 A1	29-06-2001
		GB 2354711 A	04-04-2001
		HK 1032547 A1	23-04-2004
		IT MI20001803 A1	04-02-2002
		JP 2001072151 A	21-03-2001
		KR 20010050024 A	15-06-2001
		MX PA00007801 A	24-04-2002
		NL 1015694 A1	13-02-2001
		NL 1015694 C2	06-08-2001
		NL 1018659 A1	10-09-2001
		NL 1018659 C2	19-06-2002
		NL 1018660 A1	10-09-2001
		NL 1018660 C2	18-06-2002
		NZ 505758 A	30-11-2001
		PL 341888 A1	12-02-2001
		TW 548230 B	21-08-2003
		WO 0110739 A2	15-02-2001
US 2008149665 A1	26-06-2008	NONE	
WO 2008034977 A2	27-03-2008	AU 2007298859 A1	27-03-2008
		CN 101511393 A	19-08-2009
		FR 2905870 A1	21-03-2008
		JP 2010503441 A	04-02-2010
		KR 20090057247 A	04-06-2009
		RU 2009114287 A	27-10-2010
		US 2010215549 A1	26-08-2010
		WO 2008034977 A2	27-03-2008
WO 2012001405 A1	05-01-2012	GB 2481635 A	04-01-2012
		WO 2012001405 A1	05-01-2012
WO 2012059771 A1	10-05-2012	GB 2485279 A	09-05-2012
		US 2012111966 A1	10-05-2012
		WO 2012059771 A1	10-05-2012