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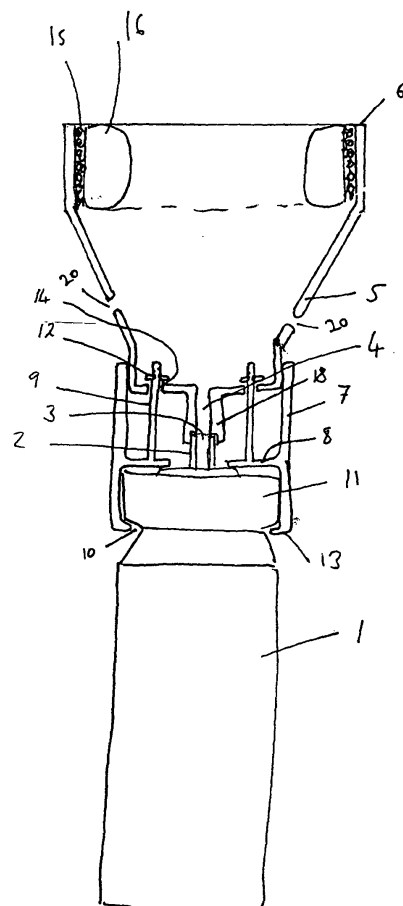
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(54) **Cleaning device and method**

(57) A device and method for cleaning carpets, fabric and upholstery has a pressurised container which discharges a jet of cleaning composition onto the surface to be cleaned. A containment skirt defines the area to be cleaned and surrounds and contains the jet of cleaning composition. The skirt may include an absorbent pad for collecting excess cleaning composition and soil.

Fig 4.



Description

[0001] The invention relates to devices, methods, and compositions for cleaning carpets, Fabric and upholstery. More specifically the invention relates to the use of pressurised aerosol containers for cleaning carpets, fabric and upholstery.

[0002] Fabric and carpet fibres are easily stained on contact with various soils such as perfumes, particulate matter, grease, oil, wine, food remains etc. Such stains are generally removed by compositions containing combinations of cleansing agents. In addition to conventional cleansing compositions such as fabric detergent powders, washing up liquid, floor cleaners, all of which may be suitable for use in cleaning stains from fabric and carpet, specialised carpet and upholstery cleaning compositions and devices have been developed.

[0003] US4,780,100 discloses foaming aqueous aerosol fabric cleaning composition for use in cleaning of carpets. US4,561,992 discloses an aerosol cleaning agent for textile surfaces that contains plasticized urea formaldehyde resin foam particles in addition to propellant and other ingredients. The product is applied to textile upholstery, allowed to dry, then vacuumed away from the fabric. US4,013,595 discloses a non-flammable aqueous aerosol rug cleaners using hydrocarbon propellants. JP01-284299 discloses an aerosol container with a highly flammable stain removing liquid, where the aerosol is furnished with a stain removing tool furnished with bristles. Such foaming cleaning compositions have a number of disadvantages. The foams may contain high proportions of air, which can result in an incomplete contacting of stain with the product and thus lead to sporadic cleaning. Moreover, foam which is not completely removed from the surface can form residues which are undesirable and require additional cleaning. A further disadvantage is that the bulk of the foam may prevent the composition from effectively penetrating through carpet or fabric fibre.

[0004] A further disadvantage of prior art aerosol devices is that there is no control of the spread of the cleaning composition when applied to a stain, and so unsoiled portions of the surface to be treated may be unnecessarily contacted with the cleaning composition.

[0005] Moreover, the user has little guidance as to how close or far to hold the aerosol composition from the surface to be cleaned, and there is the risk of composition splashing back from the surface being cleaned and contaminating the skin, eyes, or surrounding objects. As a result of this the user may hold the device too far from the surface to be cleaned to avoid such splashing, leading to ineffective penetration of the composition into the bulk of the carpet or upholstery or fabric.

[0006] Hence, there is a need for a device to allow effective penetration of a cleansing composition into carpet, fabric or upholstery where a stain or soil is to be removed, and which prevents excessive spreading or splashing of the composition, while also providing excel-

lent penetration of the composition into the bulk of the surface to be cleaned.

[0007] There is also a need for a small simple and convenient device for carpet cleaning, which can be easily stored for ready access without assembly, such that staining of carpets and upholstery or carpets can be rapidly tackled before the stain dries out. This is not the case for large-scale carpet and upholstery cleaning devices such as carpet shampooing equipment. There is thus the need for a small hand-held device.

[0008] In a first aspect the present invention provides a device for cleaning a surface comprising:

a pressurised container holding a cleaning composition, the pressurised container having a nozzle at its distal end, the nozzle having a distal face with a discharge orifice, the discharge orifice which is in fluid connection with the cleaning composition, through a valve actuated for dispensing a jet of the cleaning composition,

the pressurised container being mounted by a mounting means to an applicator head comprising a means for actuating the valve, an entrance orifice in fluid connection with the discharge orifice and a rigid containment skirt connected to the discharge orifice at its proximal end and with a substantially planar rim at its distal end, whereby when the valve is actuated, the jet of cleaning composition is directed through the entrance orifice to the centre of the space defined by the rim of the rigid containment skirt.

[0009] The cleaning composition is stored in and dispensed from a pressured, corrosion resistant container that is equipped with a nozzle having an discharge orifice so that a jet of the composition can be directed at the surface to be cleaned. Suitable containers or dispensers are known as aerosol containers and include a sealed chamber where a cleaning fluid and propellant are stored, and a hollow stem or tube having a distal end located within the chamber and a proximal end outside. The proximal end is connected to a nozzle through a valve which must be actuated in order for dispensing of the cleaning composition to occur, the nozzle having an orifice appropriately dimensioned to provide a jet of cleaning composition having an approximately conical distribution pattern, wherein the semi-angle of the cone is suitably 20° or less, preferably 15° or less, more preferably 10° or less.

[0010] The flow of cleaning composition through the nozzle is regulated by a valve that is pressure activated. It is preferred that the valve is actuated by a force applied to the nozzle in the direction from the nozzle end towards the body of the pressurised container. Suitable valves for use in the devices of the invention include valves such as the Koh-I-Noor™ PU foam valve VAV-1 with a 4mm outlet diameter and the Lindal™ group PU45 valve with 4mm outlet diameter.

[0011] Preferably, the valve is a metered valve, by

which it is meant that when the valve is actuated, it opens for a predetermined time to release a jet of cleaning composition, then closes. This gives the advantage of preventing the user from inadvertently firing an excessive volume of cleaning composition at the surface to be cleaned so that the surface becomes wetted excessively.

[0012] The pressurised container is pressurised with a gaseous component generally known as a propellant. Preferred propellants for use in the invention are compressed air, nitrogen, carbon dioxide, other inert gasses, or hydrocarbons such as isobutene, butane 40, butane 70 or dimethyl ether.

[0013] In an alternative embodiment of the invention, the pressurised container may be of the type where a manually operated pump is used to provide an overpressure inside the container, by pumping air into the container to act as a propellant.

[0014] An alternative type of pressurised container that may be employed in the devices in the invention, includes a barrier or bag that separates the cleaning composition from the propellant. Such "bag in can" pressurised containers are described in US4,260,110. These have the advantage that the dispensing of cleaning composition from the pressurised container is independent of the orientation of container. These also have the advantage that they overcome any incompatibility problems between the propellant and the cleaning composition, as these are kept separate by the barrier or bag.

[0015] The pressurised container is such that when the valve is fully opened so that flow of the cleaning composition and propellant takes place through the nozzle, the discharge rate of the composition (including any propellant) is suitably from 20 to 100 gm/second, preferably from 25 to 80 gm/second, more preferably from 30 to 60 gm/second. Such discharge rates give an effective penetration into the surface to be cleaned, while not leading to over rapid discharge and emptying of the pressurised container, such that the pressurised container may be small enough for easy handling yet contain enough cleaning composition for several treatments.

[0016] The pressurised container is preferably attached to the applicator head by an attachment means such that when the pressurised container is empty or nearly empty of cleaning composition and/or propellant, it can be easily replaced by the user. It is preferred that the applicator head is re-usable while the pressurised container is disposable.

[0017] The pressurised container is suitably provided with a lip or rim around its perimeter towards the nozzle end of the container. This allows for engagement with an attachment means such as a resilient groove or collar or lip on the interior surface of the cleaning head of the device, whereby the applicator head of the device can be firmly yet removably attached to the pressurised container. In other embodiments, the pressurised container may be furnished with other attachment means, such as a male screw thread which may engage with a female threaded collar on the applicator head.

[0018] Preferably the nozzle of the pressurised container, situated at the distal end of the container, is arranged such that when the valve is opened, the jet of cleaning composition is fired substantially along the long axis of the pressurised container, i.e. in a direction normal to the end plate of the pressurised container, into the entrance orifice of the applicator head.

[0019] The pressurised container is mounted to an applicator head.

[0020] In a simple form of the invention, the applicator head may be in the form of a rigid containment skirt directly mounted onto the nozzle of the pressurised container, and a valve actuated by pressing the nozzle towards the pressurised container is employed, such that the valve is actuated and a jet of cleaning composition is released by pressing the containment skirt towards the nozzle and the pressurised container.

[0021] In another embodiment of the invention, the applicator head may comprise an attachment collar mounted to the pressurised container, and a rigid containment skirt mounted to the attachment collar. The containment skirt will be furnished with an entrance orifice at its waist, aligned with and surrounding the discharge orifice of the nozzle such that when the valve is actuated, a jet of cleaning composition may exit from the discharge orifice, through the entrance orifice of the skirt, towards the central region of the plane formed by the rim of the containment skirt. In this type of embodiment, the actuation of the valve may be by pressing the waist of the containment skirt against the nozzle, as described above, or the applicator head may be furnished with a separate, manually operated trigger used to actuate the valve and release a jet of cleaning composition. Preferably, the device is furnished with a child-proof lock to prevent accidental operation of the device.

[0022] The rigid containment skirt may be of any suitable shape, provided that at its proximal end it is provided with an entrance orifice it is adapted to align with the discharge orifice of the nozzle of the pressurised container, such that the jet of composition released when the valve is actuated entirely enters the region surrounded by the wall or walls of the containment skirt. Suitably the skirt may be in the form of a frustum of a cone or pyramid of cylindrical, polygonal or elliptical section, widening out from its proximal and to its distal end, the distal end being in the form of a planar rim. Suitably the skirt may be a hollow tube, of polygonal, circular or elliptical cross section, open at the distal end to form a planar rim, and closed at the proximal end save for the entrance orifice.

[0023] The walls of the containment skirt are suitably formed from a rigid polymer such as polyethylene or polystyrene, and are solid. However, it is preferable to provide one or more pressure release holes in the walls towards the proximal end of the skirt, such that the discharge of the jet, when the rim of the skirt is in contact with a surface to be cleaned, does not lead to an excessive increase in pressure in the volume confined within the walls of the skirt and the surface.

[0024] Suitably, the rim of the containment skirt has a maximum diameter of 25cm or less, preferably 20 cm or less, more preferably 15cm or less. By maximum diameter is meant the diameter of the smallest circle that would entirely enclose the rim of the containment skirt.

[0025] The containment skirt is arranged such that its distal rim is substantially normal to the flow direction of the jet of cleaning fluid, and such that the jet is directed substantially towards the centre of the area defined by the rim.

[0026] The distance between the discharge orifice and the centre of the area defined by the rim, measured along the direction of the jet of cleaning composition, is suitably from 0.2 to 25 cm, preferably from 0.3 to 20 cm, more preferably from 0.5 to 15 cm.

[0027] In a preferred embodiment, the waist (proximal) end of the containment skirt is slidably mounted in a collar, the collar being removably mounted to a pressurised container at the collar's proximal end, such that the surface of the waist surrounding the entrance orifice of the containment skirt can press against the surface of the nozzle surrounding the discharge orifice. Preferably the two surfaces are provided with a means, such as a tongue and groove, such that they can mate together to give a fluid-tight seal. The valve is connected to the nozzle and is adapted to discharge a jet of cleaning composition through the entrance orifice of the containment skirt when the nozzle is pressed by the surface of the waist of the containment skirt, towards the body of the pressurised container. In this embodiment, the device is used by pressing the rim of the containment skirt flat against the surface to be cleaned, defining a region to be cleaned such that the valve is actuated and a jet of cleaning composition is directed towards the centre of the region to be cleaned.

[0028] In another embodiment of the invention, the pressurised container may be enclosed within a housing sheath, the housing sheath having the applicator head at its distal end and a handle comprising a trigger at its proximal end. In use, the user grasps the handle and when the trigger is pressed, this is adapted to push the pressurised canister along the sheath towards the applicator head at the distal end of the sheath, causing the entrance orifice of the applicator head to depress the nozzle towards the end plate of the pressurised container, opening the valve and releasing a jet of cleaning composition. This arrangement has the advantage that the trigger may be provided with a child-proof locking arrangement to prevent accidental triggering of the release of the jet of cleaning composition.

[0029] The cleaning composition to be used in the invention is a liquid with a kinematic viscosity (as measured by capillary viscometer) at 25°C of 10000 mm²sec⁻¹ or less, preferably 3000 mm²sec⁻¹ more preferably 1000 mm²sec⁻¹ or less. These preferred viscosities ensure that the composition penetrates soft surfaces such as fabric, upholstery and carpet, readily lifting soil.

[0030] The composition of the cleaning composition,

as detailed below, does not include in the calculation of percentage by weight any propellant which may be dissolved or dispersed in the cleaning composition when the composition is placed along with propellant in the pressurised container.

[0031] The cleaning composition is preferably an aqueous composition, by which it is meant that it comprises 60% or more by weight of water, preferably 70% or more, more preferably 80% or more. Suitably the composition comprises less than 99% by weight of water.

[0032] Preferably, the cleaning composition is a non-foaming composition. By this it is meant that any foam generated when the composition is agitated is unstable and collapses within 1 minute of ending agitation, preferably within 30 seconds, more preferably within 10 seconds. This may be suitably measured by placing 100 ml of composition in a 500ml beaker and whisking it for 30 seconds with a food mixer. Where necessary, the cleaning composition may comprise an anti-foaming agent, such as a polydialkylsiloxane oil, at a level from 0.1 to 2% by weight, preferably 0.2 to 1% by weight, in order to suppress foaming.

[0033] The cleaning composition suitably comprises one or more cleaning agents selected from but not limited to surfactants, solvents, enzymes, bleaching agents, germicidal agents, polymers and chelating agents.

[0034] The cleaning composition suitably comprises from 0.05 to 10% by weight of surfactant selected from anionic surfactant, cationic surfactant, amphoteric surfactant, zwitterionic surfactant, non-ionic surfactant and mixtures thereof. Suitable surfactants for use as cleaning agents are present at a level to aid in soil removal without generating excessive foam. Preferred are non-ionic surfactants, particularly alcohol alkoxylates.

Particularly preferred are the low-foaming ethoxylate/propoxylate non-ionic surfactants.

[0035] An organic solvent may be present as 0.1 to 10% by weight of the cleaning composition, preferably 0.2 to 6%, more preferably 0.3 to 4%.

[0036] Suitable organic solvents include, but are not limited to alcohols such as methanol, ethanol, propanol, isopropanols, n-butanol, t-butanol, isobutanol; glycols, (poly)ethylene glycol(s), glycol ethers, (poly) propylene glycol(s); ethylene, diethylene propylene, dipropylene and tripropylene glycol ethers (such as methyl, propyl or butyl ethers), hexylcellosolves, butylcellosolves, methylcellosolves, esters, glycol ether esters ketones and mixtures thereof.

[0037] The cleaning composition may suitably comprise from 0.1 to 10% by weight of a bleaching agent, preferably from 0.3 to 6%, more preferably from 0.5 to 4%. Suitable bleaching agents are water-soluble peroxides such as hydrogen peroxide, sodium perborate and sodium percarbonate, or mixtures thereof. A preferred bleaching agent is hydrogen peroxide.

[0038] The cleaning composition may also suitably comprise from 0.1 to 5% by weight of a germicidal agent, preferably a cationic germicidal agent.

[0039] The cleaning composition may also suitably comprise from 0.1 to 8% by weight of a chelating agent, such as citric acid and/or its alkali metal salts, or EDTA (ethylene diamine tetraacetic acid and/or its alkali metal salts). Such chelating agents are advantageous in breaking alkali earth or heavy metal ion bridges and so enhancing stain and soil removal characteristics of the cleaning composition.

[0040] Another aspect of the invention provides a method for cleaning a soiled area of carpet, fabric or upholstery comprising the steps of:

- i) providing a device according to the other aspects of the invention as described above,
- ii) pressing the rim of the containment skirt of the device to surround the soiled area,
- iii) discharging a jet of cleaning composition onto the area.
- iv) removing cleaning composition along with displaced soil.

[0041] The cleaning composition and soil may be removed with a cloth, sponge, wipe or similar absorbent aid. Because the soil is lifted from the soiled area by the operation of the invention, there should be no need for scrubbing.

[0042] The excess composition and soil can simply be removed by blotting with an absorbent material such as disposable kitchen towel.

[0043] In another aspect of the invention, the device of the invention has an absorbent pad held within the containment skirt of the device in order to absorb some or all of the cleaning composition and soil subsequent to discharging the jet of cleaning composition towards the soiled surface.

[0044] Preferably, the absorbent pad is removably attached to the interior walls of the containment skirt, such that when the absorbent pad becomes saturated with excess cleaning composition, or soiled, it can be replaced. Any suitable means may be used for temporary attachment of the absorbent pad, such as Velcro™. The absorbent pad is suitably made from non-woven polyacrylate fibres.

[0045] The invention will now be further described, by way of example, with reference to the examples and figures. In all figures, the pressurised container (1) is shown in plan view whereas the applicator head is shown in cross-sectional view.

[0046] Figures 1 to 4 each show different embodiments of the invention. In each case, the applicator head is shown in cross section, while the pressurised container (1) is shown in plan view.

[0047] Figure 1 shows a first embodiment of the invention in which the containment skirt (5) is directly mounted to the nozzle (2) of the cylindrical pressurised container

(1). The entrance orifice (4) of the containment skirt (5) is aligned with the discharge orifice (3) of the nozzle (2) by a sleeve (18) into which the nozzle mates.

[0048] In use, the rim (6) of the containment skirt is pressed against the surface to be cleaned, by the user grasping the pressurised container. This results in the sleeve (18) pressing the nozzle (2) towards the pressurised container, opening the valve and releasing a jet of cleaning composition.

[0049] Figure 2 shows a second embodiment of the invention in which the containment skirt (5) is directly mounted to the nozzle (2) of the cylindrical pressurised container (1), where the jet of cleaning composition in use is directed axially from the pressurised container (1).

The entrance orifice (4) of the containment skirt (5) is aligned with the discharge orifice (3) of the nozzle (2) by a sleeve (18) into which the nozzle mates. In this embodiment, the entrance orifice (4) is angled to direct the jet of cleaning composition radially from the nozzle (2), and the containment skirt (5) is disposed radially with respect to the pressurised container (1).

[0050] In use, the rim (6) of the containment skirt is located against the surface to be cleaned, by the user grasping the pressurised container. The user then presses on the surface of the containment skirt adjacent to the nozzle, in the direction indicated, which results in the sleeve (18) pressing the nozzle (2) towards the pressurised container, opening the valve and releasing a jet of cleaning composition.

[0051] Figure 3 shows a third embodiment of the invention, in which the containment skirt (5) is mounted to the container and the nozzle by means of a collar (7) which receives the pressurised container. Inside the collar is mounted a resilient retainer (8) which is provided with a ridge (9) which engages with the neck (10) situated adjacent to the rim (11) of the pressurised container (1). The containment skirt (5) is attached to the collar (7) and is provided with a sleeve (18) to engage with the nozzle (2).

[0052] The pressurised container is engaged with the applicator head by sliding the nozzle-end of the pressurised container into the collar (7). The rim (11) pushes the ridge (9) of the retainer (8) aside as the container slides into the collar. The retainer (8) is arranged such that when the nozzle mates with the sleeve (18) at the entrance orifice of the containment skirt (5), the ridge (9) engages with the neck (10) of the pressurised container (1), removably mounting the applicator head to the pressurised container (1).

[0053] In use, the user grasps the pressurised container (1), and presses the rim (6) of the containment skirt (5) into the surface to be cleaned. This results in the sleeve (18) at the entrance orifice (4) of the containment skirt (5) pressing the nozzle (2) towards the pressurised container (1) and opening the valve to release a jet of cleaning composition towards the surface enclosed by the rim (6). At the same time, the collar (7) slides along the pressurised container (1), stabilising the movement.

[0054] Figure 4 shows a fourth embodiment of the invention. A collar (7) is mounted to the pressurised container (1). The collar has an internal annular plate (8) which abuts the end of the pressurised container, and is furnished with an internal ridge (13) that engages with the neck (10) to mount the collar (7) firmly to the pressurised container (1).

[0055] The distal part of the collar forms a cylindrical tube in which the cylindrical basal part of the containment skirt (5) is slidably mounted. The entrance orifice (4) of the containment skirt (5) is provided with a sleeve (18) which mates with the nozzle (2).

[0056] Alignment posts (9) are rigidly mounted to the annular plate (8) and project through holes (14) in the basal part of the containment skirt (5). Retaining clips (12) attached to the alignment posts (9) retain the basal part of the containment skirt (5) within the collar (7).

[0057] The containment skirt (5) is provided with pressure release holes (20) and is also provided with a toroidal absorbent pad (16) removably attached by Velcro™ to the walls of the containment skirt (5) adjacent to the rim (6).

[0058] The applicator head is mounted to the pressurised container (1) by pressing the end plate of the container past the internal ridge (13), pushing aside the resilient walls of the collar (7), until the end plate abuts the annular plate (8) and the internal ridge (13) is engaged with the neck (10) of the pressurised container (1).

[0059] In use, the user grasps the pressurised container (1) and presses the rim (6) of the containment skirt (5) into the surface to be cleaned. This results in the sleeve (18) at the entrance orifice (4) of the containment skirt (5) pressing the nozzle (2) towards the pressurised container (1) and opening the valve to release a jet of cleaning composition towards the surface enclosed by the rim (6). At the same time, the basal part of the containment skirt slides inside the cylindrical tube of the collar (7), stabilising the movement. Excess pressure formed when the jet of cleaning composition is released within the space enclosed by the containment skirt (5) and the surface to be cleaned is vented through the pressure-release holes (20). Excess cleaning fluid along with soil lifted from the surface to be cleaned is absorbed by the toroidal absorbent pad (16) which can be subsequently removed from the Velcro™ attachment (15).

Claims

1. A device for cleaning a surface comprising:

a pressurised container holding a cleaning composition, the pressurised container having a nozzle at its distal end, the nozzle having a distal face with a discharge orifice, the discharge orifice which is in fluid connection with the cleaning composition, through a valve actuated for dispensing a jet of the cleaning composition,

the pressurised container being mounted by a mounting means to an applicator head comprising a means for actuating the valve, an entrance orifice in fluid connection with the discharge orifice and a rigid containment skirt connected to the discharge orifice at its proximal end and with a substantially planar rim at its distal end, whereby when the valve is actuated, the jet of cleaning composition is directed through the entrance orifice to the centre of the space defined by the rim of the rigid containment skirt.

2. A device according to claim 1 wherein the nozzle is the actuating means, and the valve is actuated by pressing the distal face of the nozzle towards the pressurised container.

3. A device according to claim 2 wherein the valve is actuated by grasping the pressurised container and pressing the rim of the rigid containment skirt into a surface to be cleaned

4. A device according to any preceding claim wherein the attachment means comprises a collar removably attached to the distal end of the pressurised container, surrounding the nozzle, and the rigid containment skirt is provided with a neck slidably mounted in the collar such that the entrance orifice in the neck is aligned with the discharge orifice of the nozzle, whereby grasping the pressurised container and pressing the rim of the skirt onto a surface causes the neck to press the distal face of the nozzle, actuating the valve.

5. A device according to any one of claims 1 to 3 wherein the attachment means comprises a collar removably and slidably attached to the distal end of the pressurised container, surrounding the nozzle, wherein the rigid containment skirt is mounted on the collar such that the entrance orifice in the neck is aligned with the discharge orifice of the nozzle, whereby grasping the pressurised container and pressing the rim of the skirt onto a surface causes the distal face of the nozzle to press against the entrance orifice, actuating the valve.

6. A device according to any preceding claim wherein an absorbent pad is held within the containment skirt.

7. A device according to any preceding claim wherein the cleaning composition is a non-foaming cleaning composition.

8. A method for cleaning a soiled area of carpet, fabric or upholstery comprising the steps of:

i) providing a device according to any preceding

claim,

ii) pressing the rim of the containment skirt of the device to surround the soiled area,

iii) discharging a jet of cleaning composition onto the area.

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iv) removing cleaning composition along with displaced soil.

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fig 1

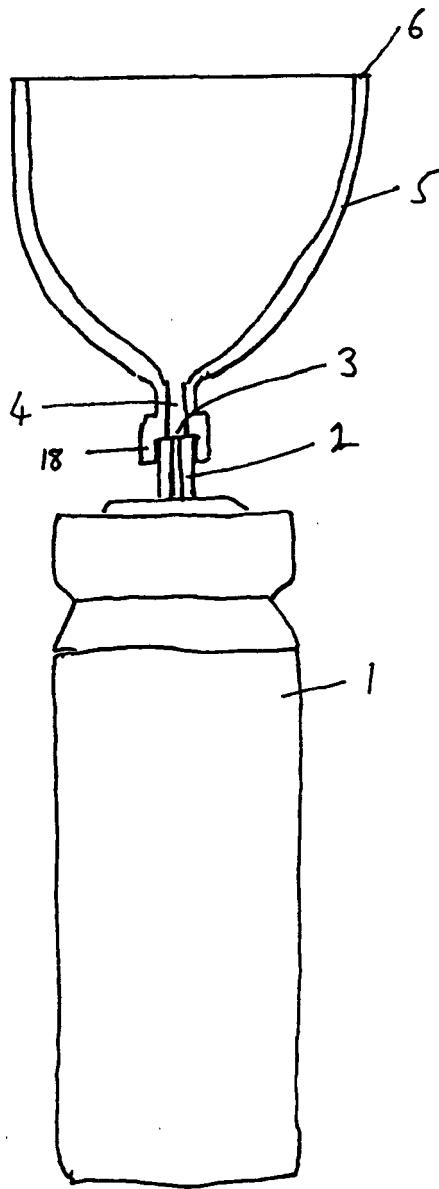
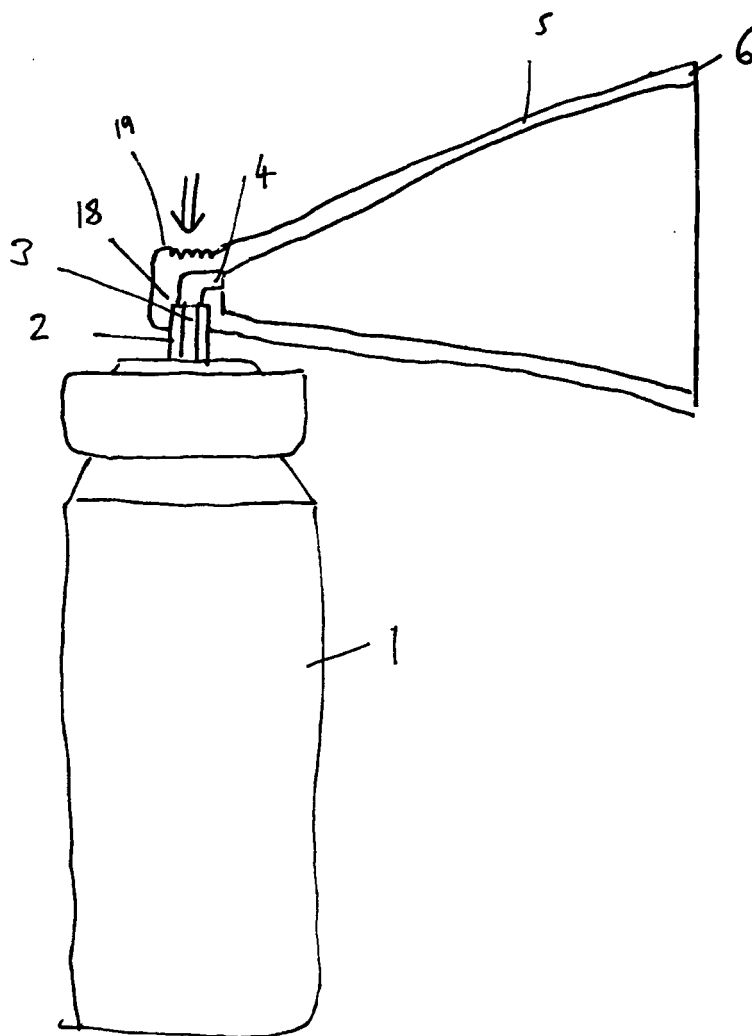


Fig 2



fy 3

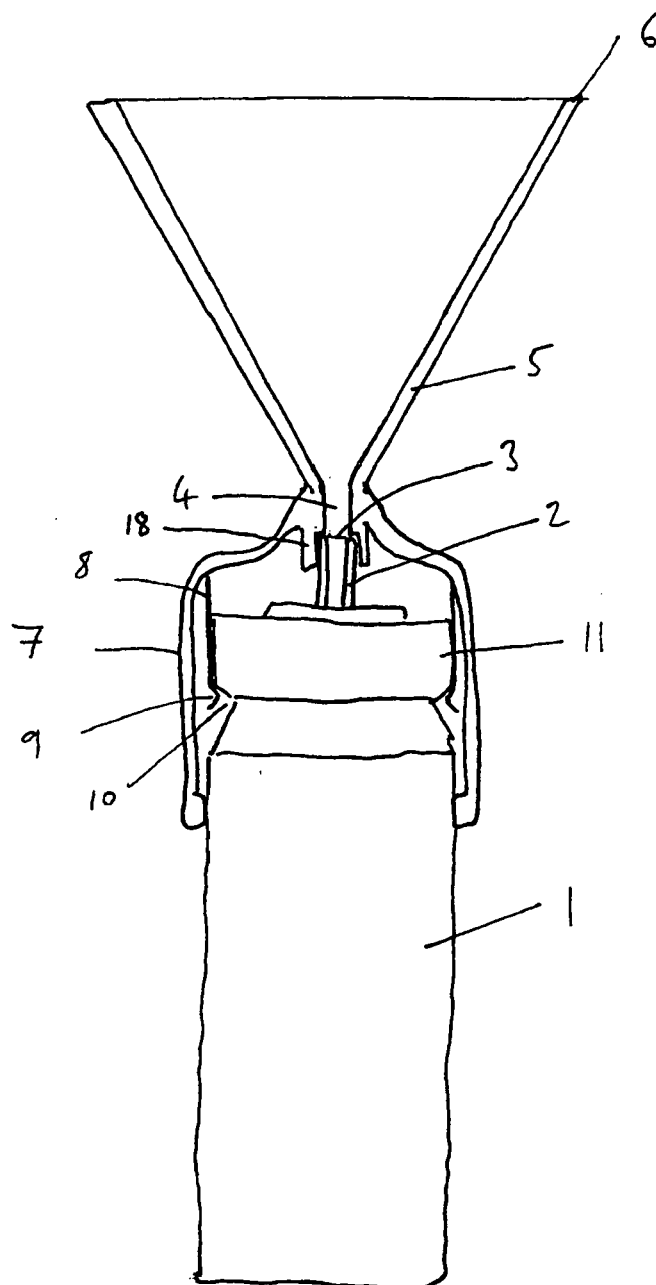
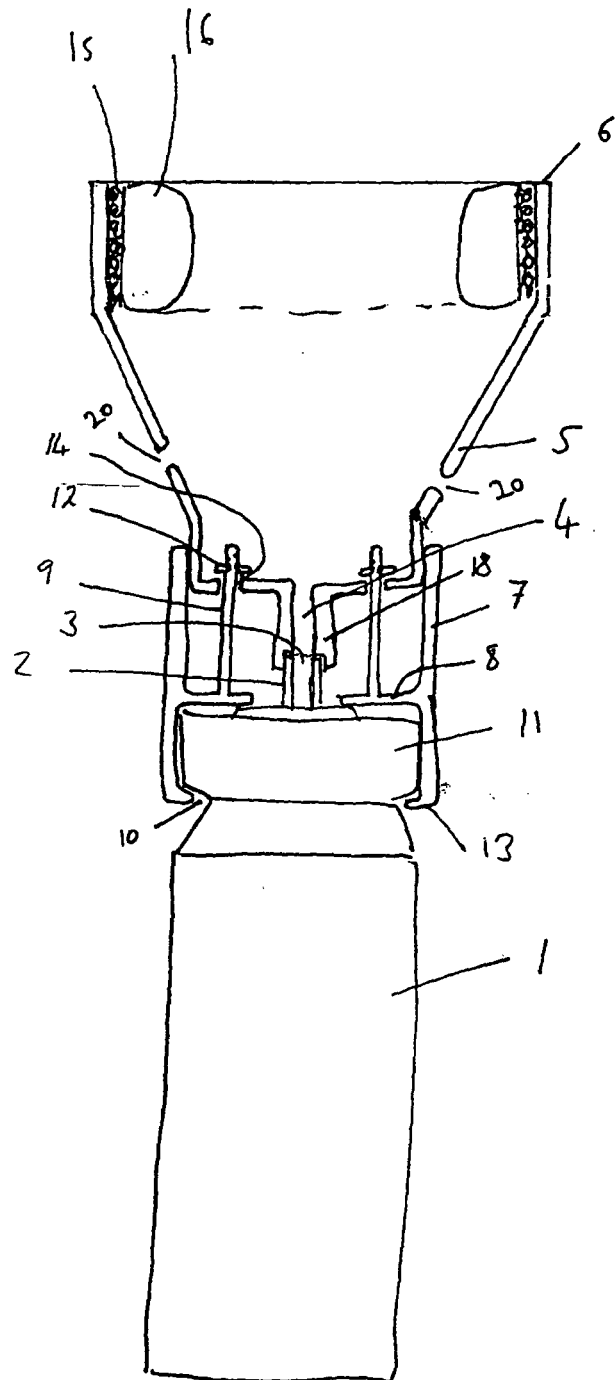


Fig 4.





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 01 9415

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 3 February 2006	Examiner Appelt, L
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 05 01 9415

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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03-02-2006

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