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(54) METERED-DOSE SPRAY VALVE

(57) The present invention relates to a metered dose aerosol valve, comprising: an internal valve body, a dose-metering valve chamber arranged inside the internal valve body, and an internal valve stem axially penetrating the dose-metering valve chamber; a middle part of the internal valve stem is provided with an annular boss, a first gasket is fixedly arranged on the dose-metering valve chamber, and the first gasket matches an upper stem body, located above the annular boss, of the internal valve stem in a sealing manner; the upper stem body is provided with radially distributed liquid inlet holes and axially distributed liquid discharge holes; a bottom of the liquid discharge hole is in communication with the liquid inlet hole; a lower stem body, located below the annular boss, of the internal valve stem is provided with a first annular conical face, an end opening at a bottom of the dose-metering valve chamber is provided with a second annular conical face, and the first and second annular conical faces are vertically opposite to each other; and when the internal valve stem is pressed down, and the internal valve stem is moved down until the liquid inlet hole on the internal valve stem is located below the first gasket, the first and second annular conical faces are adapted to match each other in a sealing manner, so it is possible to only spray out liquid inside the dose-metering valve chamber, thereby implementing a metered dose aerosol spraying function.

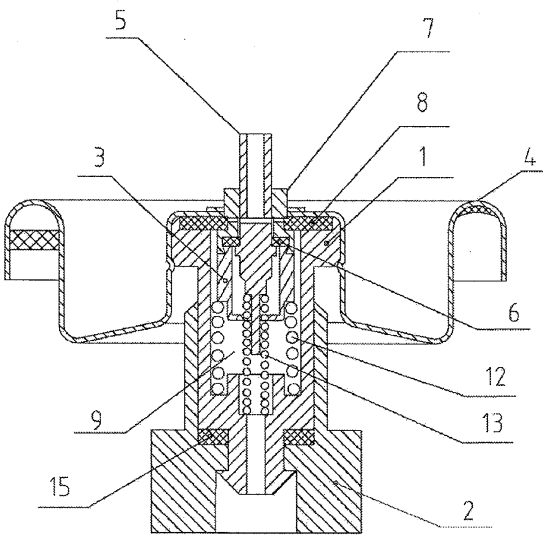

Fig. 1

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a metered dose aerosol valve.

BACKGROUND OF THE INVENTION

[0002] A Chinese patent ZL200810020952.4 relates to an aerosol valve having good airtightness and being capable of preventing internal leakage. A valve body thereof includes an internal valve body made of a leakage resistant material, such as POM, and an external valve body made of a weldable material, such as PE, where the external valve body is sleevedly connected to an outer side of the internal valve body in a sealing manner. During use, the external valve body is connected to an inlet of a flexible pouch in a sealing manner. Because the external valve body is made of a PE material, it is convenient to connect the external valve body to the flexible pouch in a sealing manner. However, the PE material is air permeable, and the internal valve body is made of a POM material having high strength and good airtightness, so its leakage resistant performance is relatively great. Therefore, the internal and external valve bodies of a valve body are respectively made of the two types of materials, which not only satisfies a requirement of connecting the valve body to the flexible pouch in a sealing manner, but also satisfies requirements on airtightness and leakage resistance of the valve body.

[0003] The foregoing prior art document has the following demerits: metered dose aerosol spraying cannot be implemented; and gas filling and liquid filling methods are relatively cumbersome.

SUMMARY OF THE INVENTION

[0004] The technical problem the present invention attempts to solve is providing a metered dose aerosol valve having a simple structure and adapted to implement metered dose aerosol spraying.

[0005] In order to solve the foregoing problem, the present invention provides a metered dose aerosol valve, including an internal valve body, a dose-metering valve chamber arranged inside the internal valve body, and an internal valve stem axially penetrating the dose-metering valve chamber; a middle part of the internal valve stem is provided with an annular boss, a first gasket is fixedly arranged on the dose-metering valve chamber, and the first gasket matches an upper stem body, located above the annular boss, of the internal valve stem in a sealing manner; the upper stem body is provided with radially distributed liquid inlet holes and axially distributed liquid discharge holes; a bottom of the liquid discharge hole is in communication with the liquid inlet hole; a lower stem body, located below the annular boss, of the internal valve stem is provided with a first annular conical face, an end opening at a bottom of the dose-metering valve chamber is provided with a second annular conical face, and the first and second annular conical faces are vertically opposite to each other; and when the internal valve stem is pressed down and the internal valve stem is moved down until the liquid inlet hole on the internal valve stem is located below the first gasket, the first and second annular conical faces are adapted to match each other in a sealing manner.

[0006] As a preferable approach, the liquid discharge holes and the radial through-holes are distributed coaxially.

[0007] As a preferable approach, in a static state, the liquid inlet hole on the upper stem body is higher than the first gasket.

[0008] The metered dose aerosol valve further includes an external valve body matching a lower middle part of the internal valve body in a sealing manner, where the external valve body is used for connecting to an opening of a flexible pouch in a sealing manner, and the flexible pouch is used for canning liquid used for generating an aerosol.

[0009] The sealing cap is used for matching an end opening at a top of a pressure-bearing can in a sealing manner, the flexible pouch is entirely arranged inside the pressure-bearing can, and the pressure-bearing can is filled with a high-pressure gas used for squeezing the flexible pouch, so as to spray an aerosol when the metered dose aerosol valve is enabled; when the internal valve stem is pressed down and makes the first and second annular conical faces match each other in a sealing manner, it is possible to only spray out liquid inside the dose-metering valve chamber, so as to implement a metered dose aerosol spraying function.

[0010] In order to achieve a purpose of filling liquid to the flexible pouch through the internal valve stem, the metered dose aerosol valve further includes: an external valve stem and a sealing cap fixedly sleeved on a top of the internal valve body; a bottom of the external valve stem is fixedly connected to a top of the dose-metering valve chamber, the first gasket is adapted to connect the external valve stem to the dose-metering valve chamber in a sealing manner, the external valve stem is provided with an annular mesa, an upper column body, located above the annular mesa, of the external valve stem is adapted to penetrate a central through-hole on the sealing cap, and a column face of the upper column body of the external valve stem and the top of the internal valve body match the sealing cap in a sealing manner through a second gasket; the upper column body of the external valve stem is provided with a radial through-hole, and two ends of the radial through-hole match an inner ring of the second gasket in a sealing manner; and a first spring is arranged between a bottom of the dose-metering valve chamber and an inner wall at a bottom of the internal valve body, and a second spring is arranged between the internal valve stem and the inner wall at the bottom of the internal valve body.

[0011] A top face of the internal valve body is provided with an annular groove, and the second gasket is arranged inside the annular groove, so as to facilitate fixing the second gasket to ensure its impermeability.

[0012] An aerosol device to which the metered dose aerosol valve is applied includes the flexible pouch used for canning liquid used for generating an aerosol and a pressure-bearing can used for filling a high-pressure gas; an opening of the flexible pouch is connected to the external valve body in a sealing manner; the flexible pouch is entirely arranged inside the pressure-bearing can, and the sealing cap fixedly matches the end opening at the top of the pressure-bearing can in a sealing manner.

[0013] A liquid filling method of the aforementioned aerosol device, includes: pressing down the external valve stem, and making the external valve stem move down and the radial through-hole on the external valve stem located below the second gasket; then filling filled liquid through the end opening at the top of the internal valve stem, and the filled liquid entering an external valve chamber located between the internal valve body and the dose-metering valve chamber through radial through-holes on the internal valve stem and external valve stem in sequence and then entering the flexible pouch through a through-hole at the bottom of the internal valve body; and after filling up, it is only necessary to release the external valve stem, and under the effect of the first and second springs, the radial through-hole on the external valve stem resumes matching the second gasket in a sealing manner.

[0014] A center at the bottom of the internal valve stem has an extension rod extending downward, the second spring is sleeved on the extension rod, and when the internal valve stem is squeezed down, the extension rod is adapted to implement a guiding function, which is favorable to implementing vertical straight-line displacement of the internal valve stem.

[0015] This invention further provides an aerosol valve, including a valve body, where the valve body includes an internal valve body made of a(n) POM, PA, ABS, PC, HIPS, PET, PPS, or PEI material and an external valve body made of a PE or PP material, and the external valve body is sleevedly connected to an outer side of the internal valve body in a sealing manner.

[0016] An inner wall of the external valve body is provided with an annular boss, a lower end portion of the internal valve body is sleevedly connected to the annular boss, and a bottom of the internal valve body has a barb.

[0017] The upper end face of the annular boss is provided with a lower gasket, used for making contact faces between an upper end face of the annular boss and a lower end portion of the internal valve body airtight.

[0018] An inner wall of the lower end portion of the external valve body is provided with a bushing, a lower end of the internal valve body is a tubular portion having a diameter less than that of the internal valve body, the tubular portion extends into the bushing, and the bushing is also sleeved by a clamping ring making contact faces between the tubular portion and the bushing airtight.

[0019] Upper end openings of the internal valve body and external valve body have hems arranged up and down; a sealing cap is arranged on the pair of hems, and an upper gasket is arranged between the hem of the upper end opening of the internal valve body and the sealing cap; a valve core is arranged inside a valve body chamber of the internal valve body, a bottom of the valve core is provided with a spring, an upper end portion of the valve core is a hollow chamber, and the upper end portion penetrates out of the sealing cap; a neck portion of the valve core is provided with at least one through-hole in communication with the hollow chamber; the upper gasket is sleeved on the neck portion of the valve core, and the upper gasket enables airtightness between the through-hole and the valve body chamber of the internal valve body; and the neck portion of the valve core is an annular groove.

[0020] A side wall below the neck portion of the valve core is provided with 1 to 10 grooves.

[0021] Upper end openings of the internal valve body and external valve body have hems arranged up and down; a sealing cap is arranged on the pair of hems, and an upper gasket is arranged between the hem of the upper end opening of the internal valve body and the sealing cap; a valve core is arranged inside a valve body chamber of the internal valve body, a bottom of the valve core is provided with a spring, and an upper end portion of the valve core is a hollow chamber, and an upper end face of the internal valve body is provided with an annular protrusion portion having a triangular section, so as to enable airtightness between an opening at a top of the valve core and a lower end face of the upper gasket.

[0022] The lower end of the internal valve body is connected to a liquid guiding pipe, and an upper end portion of the liquid guiding pipe is provided with 1 to 3 side holes; and the upper end face of the internal valve body is provided with an annular protrusion portion having a triangular section.

[0023] With respect to the prior art, the present invention has positive effects: (1) when the metered dose aerosol valve of the present invention is used, it is only necessary to quickly press down the internal valve stem and make the internal valve stem move down until the liquid inlet hole on the internal valve stem is located below the first gasket, and the first and second annular conical faces are adapted to match each other in a sealing manner, so as to make the dose-metering valve chamber form a sealed chamber; at this time, only liquid in the sealed chamber can be sprayed out, thereby achieving the metered dose aerosol spraying purpose; (2) when the aerosol valve of the present invention is used, the outer side face of the external valve body is connected to the inlet of the flexible pouch in a sealing manner; because the external valve body is made of a weldable material such as PE or PP, it is convenient to weld and connect the external valve body to the flexible pouch in a sealing manner; however, the PE material is air permeable, and the

internal valve body is made of a leakage resistant material, such as POM, PA, ABS, PC, HIPS, PEI, PPS, or PEI, having high strength and good airtightness, so its leakage resistant performance is relatively great; therefore, the internal and external valve bodies are respectively made of the two types of materials, which not only satisfies a requirement of connecting the valve body to the flexible pouch in a sealing manner, but also satisfies requirements on airtightness and leakage resistance of the valve body, thereby satisfying relevant use requirements; welding indicates a method for connecting to the flexible pouch, and weldability indicates a property that such a material can be connected to the flexible pouch in a welding manner; (3) in an aerosol valve of the present invention, a barb clamping portion at the lower end of the internal valve body matches the annular boss on the inner wall of the external valve body and combines with the lower gasket, thereby ensuring airtightness of contact faces between the internal valve body and the external valve body.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] In order to make it easier for the disclosure of the present invention to be clearly understood from the detailed description of embodiments and the accompanying drawings, the present invention is further described in detail, wherein:

FIG. 1 is a schematic diagram of a sectional structure of a metered dose aerosol valve according to the present invention;
FIG. 2 is a structural schematic diagram of an external valve stem in FIG. 1;
FIG. 3 is a structural schematic diagram of an internal valve stem in FIG. 1;
FIG. 4 is a structural schematic diagram of a dose-metering valve chamber in FIG. 1;
FIG. 5 is a structural schematic diagram of an external valve body in FIG. 1;
FIG. 6 is a structural schematic diagram of an internal valve body in FIG. 1;
FIG. 7 is an A-direction view of FIG. 5;
FIG. 8 is a schematic diagram of a sectional structure of an aerosol device to which the foregoing metered dose aerosol valve is applied;
FIG. 9 is a schematic diagram of a sectional structure of another metered dose aerosol valve;
FIG. 10 is a structural schematic diagram of an external valve body in FIG. 9;
FIG. 11 is a B-direction view of FIG. 10;
FIG. 12 is a sectional view of an aerosol valve in Embodiment 4;
FIG. 13 is a sectional view when the aerosol valve is arranged on a flexible pouch;
FIG. 14 is a sectional view of an aerosol valve in Embodiment 5;
FIG. 15 is a sectional view of a preferable aerosol valve;
FIG. 16 is a sectional view of another preferable aerosol valve;
FIG. 17 is a schematic diagram of another preferable structure of the external valve stem according to FIG. 2, where convex rings 74 having a triangular section are respectively arranged on an edge of an annular mesa 71 of the external valve stem and an inner side wall of a chamber at a bottom of the external valve body, so as to ensure airtightness between the external valve stem and a corresponding gasket;
FIG. 18 is a schematic diagram of another preferable structure of the internal valve stem according to FIG. 3, where a convex ring portion 57 having a triangular section is arranged on an edge of an annular boss 51 in a middle part of the internal valve stem 5, so as to ensure airtightness between the internal valve body and a corresponding gasket;
FIG. 19 is a schematic diagram of another preferable structure of the dose-metering valve chamber according to FIG. 4, where an annular protrusion 32 having a triangular section is arranged on an edge on a top face of the dose-metering valve chamber 3, so as to ensure airtightness between the dose-metering valve chamber and a corresponding gasket;
FIG. 20 is a schematic diagram of another preferable structure of the internal valve body according to FIG. 6, where an annular protrusion portion 1-3 having a triangular section is arranged on an annular groove 1-1 of the internal valve body 1, so as to ensure airtightness between the internal valve body and a corresponding gasket;
FIG. 21 is a structural diagram of another preferable variant of the internal valve body according to FIG. 20;
FIG. 22 is a structural diagram of a third preferable variant of the internal valve body according to FIG. 20;
FIG. 23 is a structural diagram of a fourth preferable variant of the internal valve body according to FIG. 20;
FIG. 24 is a structural diagram of a variant of the aerosol valve according to FIG. 15; and
FIG. 25 is a structural diagram of a variant of the aerosol valve according to FIG. 16.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Embodiment 1

[0025] As shown in FIG. 1, a metered dose aerosol valve of the present embodiment includes: an internal valve body 1, a dose-metering valve chamber 3 arranged inside the internal valve body 1, a sealing cap 4 matching a top of the dose-metering valve chamber 3 in a sealing manner, and an internal valve stem 5 axially penetrating

the sealing cap 4 and the dose-metering valve chamber 3; a middle part of the internal valve stem 5 is provided with an annular boss 51, a first gasket 6 is arranged between the dose-metering valve chamber 3 and the sealing cap 4, and the first gasket 6 matches an upper stem body 52, located above the annular boss 51, of the internal valve stem 5 in a sealing manner; the upper stem body 52 is provided with radially distributed liquid inlet holes 53 and axially distributed liquid discharge holes 54; a bottom of the liquid discharge hole 54 is in communication with the liquid inlet hole 53; a lower stem body, located below the annular boss 51, of the internal valve stem 5 is provided with a first annular conical face 55, an end opening at a bottom of the dose-metering valve chamber 3 is provided with a second annular conical face 31, and the first and second annular conical faces are vertically opposite to each other; and when the internal valve stem 5 is pressed down, and the internal valve stem 5 is moved down until the liquid inlet hole 53 on the internal valve stem 5 is located below the first gasket 6, the first and second annular conical faces are adapted to match each other in a sealing manner.

[0026] The metered dose aerosol valve further includes an external valve body 2 matching a lower middle part of the internal valve body 1 in a sealing manner, where the external valve body 2 is used for connecting to an opening of a flexible pouch 11 in a sealing manner and the flexible pouch 11 is used for canning liquid used for generating an aerosol.

[0027] A top face of the internal valve body 1 is provided with an annular groove 1-1, and the second gasket is arranged inside the annular groove.

[0028] As shown in FIG. 7, a section of the external valve body 2 is diamond-shaped or olive-shaped.

[0029] As shown in FIG. 8, an aerosol device to which the foregoing metered dose aerosol valve is applied includes the flexible pouch 11 used for canning liquid used for generating an aerosol and a pressure-bearing can 10 used for filling a high-pressure gas; an opening of the flexible pouch 11 is connected to the external valve body 2 in a sealing manner; and the flexible pouch 11 is entirely arranged inside the pressure-bearing can 10, and the sealing cap 4 fixedly matches an end opening at a top of the pressure-bearing can 10 in a sealing manner.

[0030] The pressure-bearing can 10 is filled with a high-pressure gas, used for squeezing the flexible pouch 11, so as to spray an aerosol when the metered dose aerosol valve is enabled; when the internal valve stem 5 is pressed down and makes the first and second annular conical faces match each other in a sealing manner, it is possible to only spray out liquid inside the dose-metering valve chamber 3, so as to implement a metered dose aerosol spraying function.

[0031] In order to improve a leakage resistant effect, a third gasket 15 is arranged between the external valve body 2 and the internal valve body 1.

Embodiment 2

[0032] Based on Embodiment 1, the metered dose aerosol valve of the present embodiment has the following variant.

[0033] As shown in FIG. 1 to FIG. 7, in order to achieve a purpose of filling liquid to the flexible pouch through the internal valve stem, the metered dose aerosol valve provided by the present embodiment further includes an external valve stem 7; a bottom of the external valve stem 7 matches a top of the dose-metering valve chamber 3 through the first gasket 6, a middle part of the external valve stem 7 has an annular mesa 71, and a stem body 73, located above the annular mesa 71, of the external valve stem 7 matches the sealing cap 4 through a second gasket 8 in sealing manner; the stem body 73, located above the annular mesa 71, of the external valve stem 7 is provided with a radial through-hole 72, and two ends of the radial through-hole 72 match an inner ring of the second gasket 8 in a sealing manner; and a first spring 12 is arranged between a bottom of the dose-metering valve chamber 3 and an inner wall at the bottom of the internal valve body 1, and a second spring 13 is arranged between a bottom of the internal valve stem 5 and the inner wall at the bottom of the internal valve body 1.

[0034] When liquid is filled into the flexible pouch, the external valve stem 7 is squeezed down, the external valve stem 7 is moved down, and the radial through-hole 72 on the external valve stem 7 is located below the second gasket 8; then the filled liquid is filled through an end opening at a top of the internal valve stem 5, and the filled liquid enters an external valve chamber 9 located between the internal valve body 1 and the dose-metering valve chamber 3 through a liquid inlet hole 53 of the internal valve stem 5 and the radial through-hole 72 on the external valve stem 7 in sequence, and then enters the flexible pouch 11 through a through-hole at the bottom of the internal valve body 1; after filling up, it is only necessary to release the external valve stem 7, and under the effect of the first and second springs, the radial through-hole 72 on the external valve stem 7 resumes matching the second gasket 8 in a sealing manner.

[0035] A center at the bottom of the internal valve stem 5 has an extension rod 56 extending downward, the second spring 13 is sleeved on the extension rod 56, and when the internal valve stem 5 is squeezed down, the extension rod 56 is adapted to implement a guiding function, which is favorable to implementing vertical straight-line displacement of the internal valve stem 5.

Embodiment 3

[0036] Based on Embodiment 2, the metered dose aerosol valve of the present embodiment has the following variant.

[0037] As shown in FIG. 9 and FIG. 10, an inner wall of a lower end portion of the external valve body 2 is provided with a bushing 21, a lower end of the internal

valve body 1 is a tubular portion 1-2 having a diameter less than that of the internal valve body 1, the tubular portion 1-2 extends into the bushing 21, and the bushing 21 is also sleeved by a clamping ring 17 making contact faces between the tubular portion 1-2 and the bushing 21 airtight, so as to make contact faces between the internal valve body 1 and the external valve body 2 airtight. In order to improve the leakage resistant effect, a third gasket 15 is arranged between the external valve body 2 and the internal valve body 1.

Embodiment 4

[0038] As shown in FIG. 12 and FIG. 13, an aerosol valve of the present embodiment includes a valve body; the valve body includes an internal valve body 1 made of a(n) POM, PA, ABS, PC, HIPS, PET, PPS, or PEI material and an external valve body 2 made of a PE or PP material, and the external valve body 2 is sleevedly connected to an outer side of the internal valve body 1 in a sealing manner; an inner wall of a lower end portion of the external valve body 2 is provided with a bushing 3-23, a lower end of the internal valve body 1 is a tubular portion 3-13 having a diameter less than that of the internal valve body 1, the tubular portion 3-13 extends into the bushing 3-23, and the bushing 3-23 is also sleeved by a clamping ring 17 making contact faces between the tubular portion 3-13 and the bushing 3-23 airtight. As shown in FIG. 11, a section of the external valve body 2 of the present embodiment is diamond-shaped or olive-shaped.

[0039] As shown in FIG. 12, the upper end openings of the internal valve body 1 and external valve body 2 have hems 3-11 and 3-22 arranged up and down; a sealing cap 4 is arranged on the two hems, and an upper gasket 18 is arranged between the hem of the upper end opening of the internal valve body 1 and the sealing cap 4; an internal valve stem 5 is arranged inside a valve body chamber 3-10 of the internal valve body 1, a bottom of the internal valve stem 5 is provided with a spring 15, an upper end portion of the internal valve stem 5 is a hollow chamber, and the upper end portion penetrates out of the sealing cap 4; a neck portion of the internal valve stem 5 is provided with at least one radial through-hole in communication with the hollow chamber; and the upper gasket 18 is sleeved on the neck portion of the internal valve stem 5, and the upper gasket 18 enables airtightness between the radial through-hole and the valve body chamber 3-10 of the internal valve body 1.

[0040] The neck portion of the internal valve stem 5 is an annular groove.

[0041] A side wall below the neck portion of the internal valve stem 5 is provided with 1 to 10 grooves.

[0042] As shown FIG. 23, an upper end face of the internal valve body 1 is provided with an annular protrusion portion 1-3 having a triangular section, so as to enable airtightness between an opening at a top of the internal valve stem 5 and a lower end face of the upper gasket 18.

[0043] As shown FIG. 13, the lower end of the internal valve body 1 is connected to a liquid guiding pipe 100, and an upper end portion of the liquid guiding pipe 100 is provided with 1 to 3 side holes 10-1.

[0044] When the aerosol valve of the present embodiment is provided with a flexible pouch 19 as shown in FIG. 13, if the upper end portion of the internal valve stem 5 is pressed downward, the upper gasket 18 is detached from the neck portion of the internal valve stem 5, and the through-hole is in communication with the valve chamber 3-10 of the internal valve body 1. At this time, because the air pressure in the valve chamber 3-10 (namely, the flexible pouch 19) of the internal valve body 1 is relatively high, the liquid in the flexible pouch 19 is sprayed out through respective grooves, the through-hole of the neck portion of the valve core, and the upper end portion of the internal valve stem 5 in sequence.

[0045] The side wall of the internal valve stem 5 is provided with axially arranged grooves capable of facilitate spraying out the liquid, and if there is no groove on the side wall of the internal valve stem 5, during use, the liquid in the flexible pouch 19 is sprayed out through a gap between internal valve stem 5 and the internal valve body 1, the through-hole of the neck portion of the valve core, and the upper end portion of the internal valve stem 5 in sequence.

[0046] When the aerosol valve of the present embodiment is used, an outer side face of the external valve body is connected to an opening of a flexible pouch in a sealing manner; because the external valve body is made of a weldable material, such as PE or PP, it is convenient to connect the external valve body to the flexible pouch in a seal welding manner; however, the PE material is air permeable, and the internal valve body is made of a leakage resistant material, such as POM, PA, ABS, PC, HIPS, PET, PPS, or PEI having high strength and good airtightness, so its leakage resistant performance is relatively great. Therefore, the internal and external valve bodies of the valve body are respectively made of the two types of materials, which not only satisfies the requirements of connecting the valve body with the flexible pouch in a sealing manner but also satisfies the requirements on airtightness and leakage resistance, thereby satisfying the relevant use requirements. Welding indicates a method for connecting to the flexible pouch, and weldability indicates the property that such a material can be welded with the flexible pouch. A barb clamping portion at the lower end of the internal valve body matches the annular boss on the inner wall of the external valve body and combines with the lower gasket, thereby ensuring the airtightness between contact faces of the internal valve body and the external valve body

Embodiment 5

[0047] As shown in FIG. 15, an inner wall of the external valve body 2 is provided with an annular boss 3-21, the

lower end portion of the internal valve body 1 is sleevedly connected to the annular boss 3-21, and the bottom of the internal valve body 1 has a barb 3-12. The upper end portion of the annular boss 3-21 is provided with a lower gasket 16, used for enabling airtightness between contact faces of the upper end face of the annular boss 3-21 and the lower end portion of the internal valve body 1, such that the internal valve body 1 is sleevedly connected to the external valve body 2 in a sealing manner.

[0048] During use, the outer side face of the external valve body 2 is connected to the inlet of the flexible pouch 19 in a sealing manner. Because the external valve body 2 is made of a PE material, it is convenient to connect the valve body with the flexible pouch 19 in a sealing manner. However, the PE material has air permeability, and the internal valve body is made of the POM material having high strength and good airtightness, so leakage resistant performance thereof is relatively great. Therefore, the internal and external valve bodies of a valve body are respectively made of the two materials, which not only satisfies a requirement of connecting the valve body to the flexible pouch 19 in a sealing manner, but also satisfies requirements on airtightness and leakage resistance of the valve body, thereby ensuring the relevant use requirements.

Embodiment 6

[0049] With reference to FIG. 12 and FIG. 13, an aerosol valve of the present embodiment includes a sealing cap 4, an internal valve stem 5, and a valve body. The sealing cap 4 is made of a tin plate, whereof a surface is electroplated, and the internal valve stem 5 is made of a POM (polyformaldehyde) material.

[0050] The valve body is a male valve, including an internal valve body 1 made of a POM material and an external valve body 2 sleevedly connected to an outer side of the internal valve body 1 and made of a weldable material such as PE (polyethylene) or PP (polypropylene).

[0051] The internal valve body 1 may also be made of a(n) PA (polyamide, commonly referred to as nylon), ABS (acrylonitrile-butadiene-styrene), PC (polychloroprene), HIPS (high impact polystyrene), PET (polyethylene terephthalate), PPS (polyphenylene sulfide) or PEI (polyethyleneimine) material, and the materials have good leakage resistant performance.

[0052] A section of the external valve body 2 is diamond-shaped or olive-shaped. An inner wall of the external valve body 2 is provided with an annular boss 3-21, a lower end portion of the internal valve body 1 is sleevedly connected to the annular boss 3-21, and a bottom of the internal valve body 1 has a barb 3-12. An upper end face of the annular boss 3-21 is provided with a first gasket 6 used for making contact faces between the upper end face of the annular boss 3-21 and the lower end portion of the internal valve body 1 airtight, so that the internal valve body 1 is sleevedly connected to the external valve body 2 in a sealing manner.

[0053] During use, the outer side face of the external valve body 2 is connected to an inlet of a flexible pouch in a sealing manner. Because the external valve body 2 is made of a PE material, it is convenient to connect the valve body to the flexible pouch in a sealing manner; however, the PE material is air permeable, and the internal valve body 1 is made of a POM material having high strength and good airtightness, so its leakage resistant performance is relatively great; and therefore, the internal and external valve bodies of a valve body are respectively made of the two types of materials, which not only satisfies a requirement of connecting the valve body to the flexible pouch in a sealing manner, but also satisfies requirements on airtightness and leakage resistance of the valve body, thereby ensuring relevant use requirements.

[0054] The valve body chamber 3-10 of the internal valve body 1 is provided with an internal valve stem 5, a bottom of the internal valve stem 5 is provided with a spring 15, an upper end portion of the internal valve stem 5 is a hollow chamber, and the upper end portion penetrates out of a sealing cap 4; an annular groove-shaped neck portion of the internal valve stem 5 is provided with two (in other embodiments, one, three, or even more) through-holes in communication with the hollow chamber; and the upper gasket 18 is sleeved on the neck portion of the internal valve stem 5, and the upper gasket 18 enables airtightness between the through-holes and the valve body chamber 3-10 of the internal valve body 1. A side wall below the neck portion of the internal valve stem 5 is provided with six grooves, and an arc-shaped groove on a peripheral edge of the sealing cap 4 is provided with an outer gasket 8.

[0055] When the aerosol valve of the present embodiment is arranged on the flexible pouch shown in FIG. 13, if the upper end portion of the internal valve stem 5 is pressed down, the upper gasket 18 is detached from the neck portion of the internal valves stem 5, and the through-holes are in communication with the valve chamber 3-10 of the internal valve body 1. At this time, because the air-pressure in the valve chamber 3-10 (namely, the flexible pouch) of the internal valve body 1 is relatively high, liquid in the flexible pouch is sprayed out through respective grooves, the through-holes on the neck portion of the valve core, and the upper end portion of the internal valve stem 5 in sequence.

[0056] The side wall of the internal valve stem 5 is provided with grooves capable of facilitating liquid spraying, and if there is no groove on the side wall of the internal valve stem 5; and during use, the liquid in the flexible pouch is sprayed out through a gap between the internal valve stem 5 and the inner wall of the internal valve body 1, through-holes on the neck portion of the valve core, and the upper end portion of the internal valve stem 5.

[0057] The upper end face of the internal valve body 1 is provided with two annular protrusion portions having a triangular section, so as to ensure airtightness between the upper end face of the internal valve body 1 and the

upper gasket 18.

Embodiment 7

[0058] Based on Embodiment 1, the metered dose aerosol valve of the present embodiment has the following variant.

[0059] With reference to FIG. 14, an inner wall of the lower end portion of the external valve body 2 is provided with a bushing 3-23, the lower end of the internal valve body 1 is a tubular portion 3-13 having a diameter less than that of the internal valve body 1, the tubular portion 3-13 extends into the bushing 3-23, and the bushing 3-23 is also sleeved by a clamping ring 17 making contact faces between the tubular 3-13 and the bushing 3-23 airtight, so as to make contact faces between the internal valve body 1 and the external valve boy 2 airtight.

[0060] The tubular portion 3-13 at the lower end of the internal valve body 1 may be connected to a liquid guiding pipe 100, and an upper end portion of the liquid guiding pipe 100 is provided with 1 to 3 side holes 10-1.

[0061] The upper end openings of the internal valve body 1 and external valve body 2 have hems 3-11 and 3-22 arranged up and down; a sealing cap 4 is arranged on the two hems, and an upper gasket 18 is arranged between the hem of the upper end opening of the internal valve body 1 and the sealing cap 4; an internal valve stem 5 is arranged inside a valve body chamber 3-10 of the internal valve body 1, a bottom of the internal valve stem 5 is provided with a spring 15, and an upper end portion of the internal valve stem 5 is a hollow chamber, and the upper end portion does not penetrate out of the sealing cap 4; a side wall at a top of the internal valve stem 5 is provided with at least one radial through-hole in communication with the hollow chamber; and the upper gasket 18 is sleeved on the top of the internal valve stem 5, and the upper gasket 18 enables airtightness between the radial through-hole and the valve body chamber 3-10 of the internal valve body 1.

Embodiment 8

[0062] Based on Embodiment 1, the aerosol valve of the present embodiment has the following variant.

[0063] With reference to FIG. 14, FIG. 16, and FIG. 25, the valve body is a female valve, and upper end openings of the internal valve body 1 and external valve body 2 have hems 3-11 and 3-22 arranged up and down; the pair of hems 3-11 and 3-22 are provided with a sealing cap 4, and an upper gasket 18 is arranged between the hem 3-11 of the upper end opening of the internal valve body 1 and the sealing cap 4; the internal valve stem 5 is arranged inside the valve body chamber 3-10 of the internal valve body 1, a bottom of the internal valve stem 5 is provided with a spring, and an upper end portion of the internal valve stem 5 is a hollow chamber; and as shown in FIG. 22 and FIG. 23, the upper end face of the internal valve body 1 is provided with an annular protrusion portion 1-3 having a triangular section, so as to enable airtightness between an opening 2-4 at the top of the internal valve stem 5 and the lower end face of the upper gasket 18.

[0064] It is obvious that the foregoing embodiments are merely exemplary embodiments for clearly describing the present invention, but are not intended to limit embodiments of the present invention. Persons of ordinary skill in the art could make modifications or alternations in other different forms based on the foregoing description. It is unnecessary and impossible to exhaustively exemplify all the embodiments. Moreover, apparent modifications and alternations derived from the spirit of the present invention shall fall within the protection scope of the present invention.

Claims

1. A metered dose aerosol valve, comprising an internal valve body, a dose-metering valve chamber arranged inside the internal valve body, and an internal valve stem axially penetrating the dose-metering valve chamber, wherein:

   a middle part of the internal valve stem is provided with an annular boss, a first gasket is fixedly arranged on the dose-metering valve chamber, and the first gasket matches an upper stem body, located above the annular boss, of the internal valve stem in a sealing manner; the upper stem body is provided with radially distributed liquid inlet holes and axially distributed liquid discharge holes; a bottom of the liquid discharge hole is in communication with the liquid inlet hole;
   a lower stem body, located below the annular boss, of the internal valve stem is provided with a first annular conical face, an end opening at a bottom of the dose-metering valve chamber is provided with a second annular conical face, and the first and second annular conical faces are vertically opposite to each other; and when the internal valve stem is pressed down, and the internal valve stem is moved down until the liquid inlet hole on the internal valve stem is located below the first gasket, the first and second annular conical faces are adapted to match each other in a sealing manner.

2. The metered dose aerosol valve according to claim 1, further comprising: an external valve stem and a sealing cap fixedly sleeved on a top of the internal valve body, wherein:

   a bottom of the external valve stem is fixedly connected to a top of the dose-metering valve chamber, the first gasket is adapted to connect

the external valve stem to the dose-metering valve chamber in a sealing manner, the external valve stem has an annular mesa, an upper column body, located above the annular mesa, of the external valve stem is adapted to penetrate a central through-hole on the sealing cap, and a column face of the upper column body of the external valve stem and the top of the internal valve body match the sealing cap through a second gasket;

the upper column body of the external valve stem is provided with a radial through-hole, and two ends of the radial through-hole match an inner ring of the second gasket in a sealing manner; and

a first spring is arranged between a bottom of the dose-metering valve chamber and an inner wall at the bottom of the internal valve body, and a second spring is arranged between the internal valve stem and the inner wall at the bottom of the internal valve body.

3. The metered dose aerosol valve according to claim 2, wherein a center at the bottom of the internal valve stem has an extension rod extending downward, and the second spring is sleeved on the extension rod.

4. The metered dose aerosol valve according to claim 1, wherein the metered dose aerosol valve further comprises an external valve body matching a lower middle part of the internal valve body in a sealing manner.

5. The metered dose aerosol valve according to claim 4, wherein a top face of the internal valve body is provided with an annular groove, and the second gasket is arranged inside the annular groove.

6. The metered dose aerosol valve according to claim 1, wherein: in a static state, the liquid inlet hole on the upper stem body is higher than the first gasket.

7. An aerosol device to which the metered dose aerosol valve according to claim 5 is applied, comprising: a flexible pouch used for canning liquid used for generating an aerosol and a pressure-bearing can used for filling a high-pressure gas, wherein: an opening of the flexible pouch is connected to the external valve body in a sealing manner; and the flexible pouch is entirely arranged inside the pressure-bearing can, and the sealing cap fixedly matches an end opening at a top of the pressure-bearing can in a sealing manner.

8. A liquid filling method of the aerosol device according to claim 7, comprising:

squeezing the external valve stem down and making the external valve stem move down and the radial through-hole on the external valve stem located below the second gasket, wherein:

filled liquid is filled through the end opening at the top of the internal valve stem, and the filled liquid enters an external valve chamber located between the internal valve body and the dose-metering valve chamber through the radial through-hole on the internal valve stem and external valve stem in sequence and then enters the flexible pouch through a through-hole at the bottom of the internal valve body; and after filling up, it is only necessary to release the external valve stem, and under the effect of the first and second springs, the radial through-hole on the external valve stem resumes matching the second gasket in a sealing manner.

9. An aerosol valve, comprising a valve body, wherein: the valve body comprises an internal valve body made of a(n) POM, PA, ABS, PC, HIPS, PET, PPS, or PEI material and an external valve body made of a PE or PP material, and the external valve body is sleevedly connected to an outer side of the internal valve body in a sealing manner;

an inner wall of the external valve body is provided with an annular boss, a lower end portion of the internal valve body is sleevedly connected to the annular boss, and a bottom of the internal valve body has a barb;

an upper end face of the annular boss is provided with a lower gasket used for making contact faces between the upper end face of the annular boss and the lower end portion of the internal valve body airtight;

an inner wall of a lower end portion of the external valve body is provided with a bushing, a lower end of the internal valve body is a tubular portion having a diameter less than that of the internal valve body, the tubular portion extends into the bushing, and the bushing is also sleeved by a clamping ring making contact faces between the tubular portion and the bushing airtight;

upper end openings of the internal valve body and external valve body have hems arranged up and down; a sealing cap is arranged on the pair of hems, and an upper gasket is arranged between the hem of the upper end opening of the internal valve body and the sealing cap; a valve core is arranged inside a valve body chamber of the internal valve body, a bottom of the valve core is provided with a spring, an upper end portion of the valve core is a hollow chamber, and the upper end portion penetrates out of the sealing cap; a neck portion of the valve core is provided with at least one through-hole in commu-

nication with the hollow chamber; the upper gasket is sleeved on the neck portion of the valve core, and the upper gasket enables airtightness between the through-hole and the valve body chamber of the internal valve body;
the neck portion of the valve core is an annular groove; and
a side wall below the neck portion of the valve core is provided with 1 to 10 grooves.

10. The aerosol valve according to claim 9, wherein: upper end openings of the internal valve body and external valve body have hems arranged up and down; a sealing cap is arranged on the pair of hems, and an upper gasket is arranged between the hem of the upper end opening of the internal valve body and the sealing cap; a valve core is arranged inside a valve body chamber of the internal valve body, a bottom of the internal valve stem is provided with a spring, an upper end portion of the valve core is a hollow chamber, an upper end face of the internal valve body is provided with an annular protrusion portion having a triangular section, so as to enable airtightness between a top opening of the valve core and an lower end face of the upper gasket; and
a lower end of the internal valve body is connected to a liquid guiding pipe, an upper end portion of the liquid guiding pipe is provided with 1 to 3 side holes, and the upper end face of the internal valve body is provided with an annular protrusion portion having a triangular section.

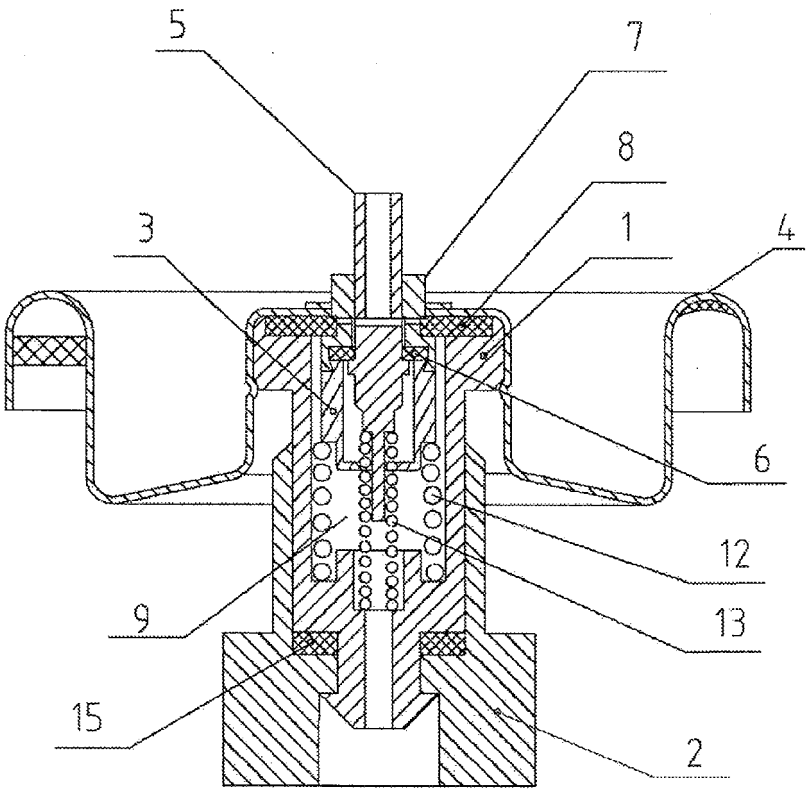

Fig. 1

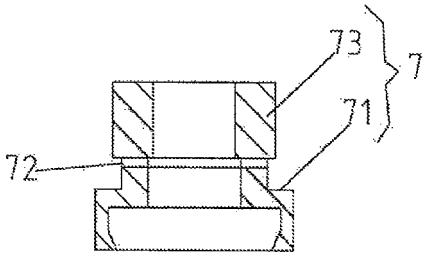

Fig. 2

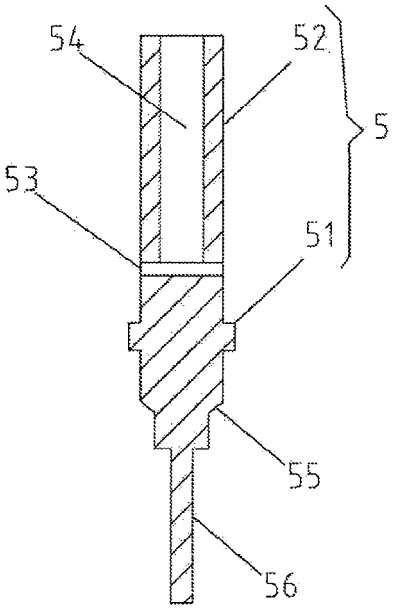

Fig. 3

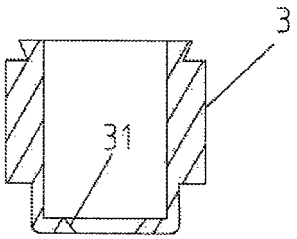

Fig. 4

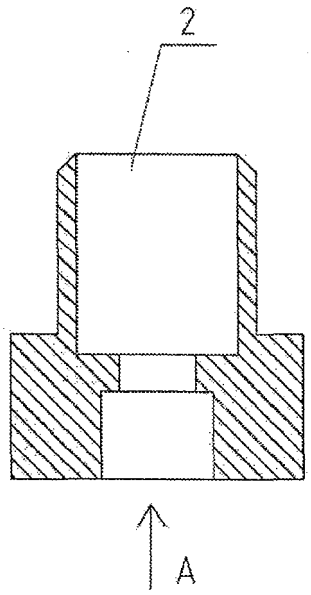

Fig. 5

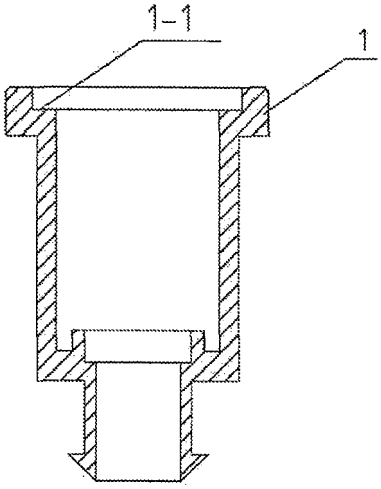

Fig. 6

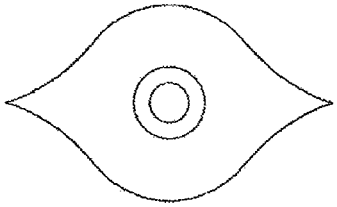

Fig. 7

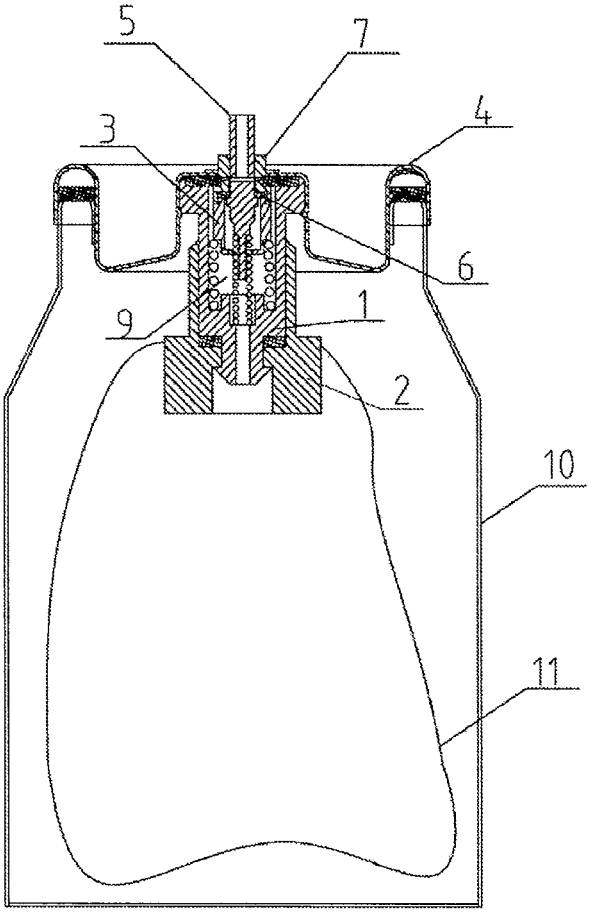

Fig. 8

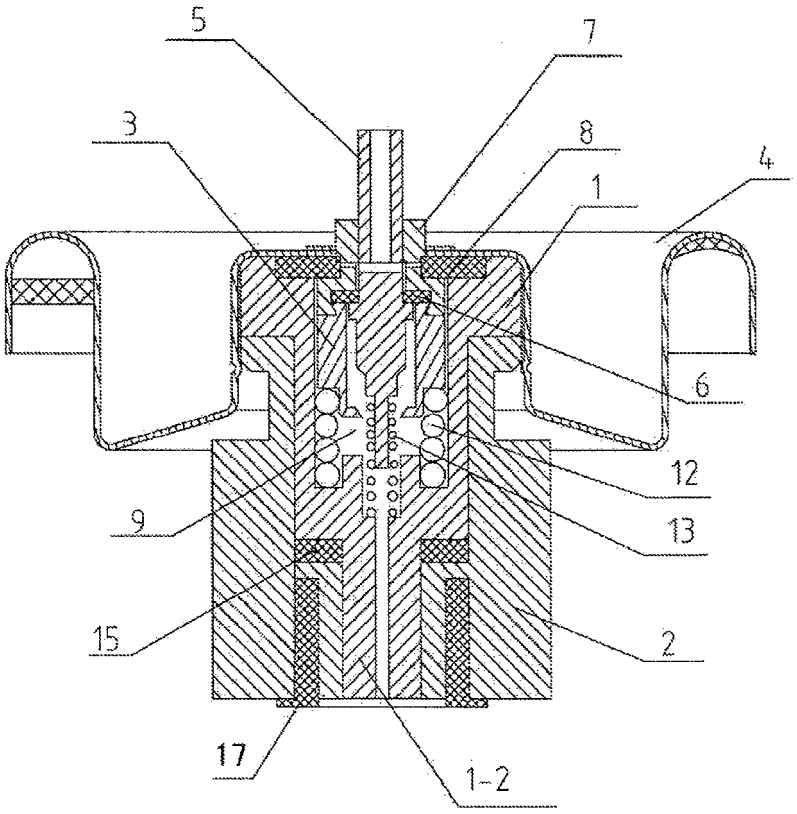

Fig. 9

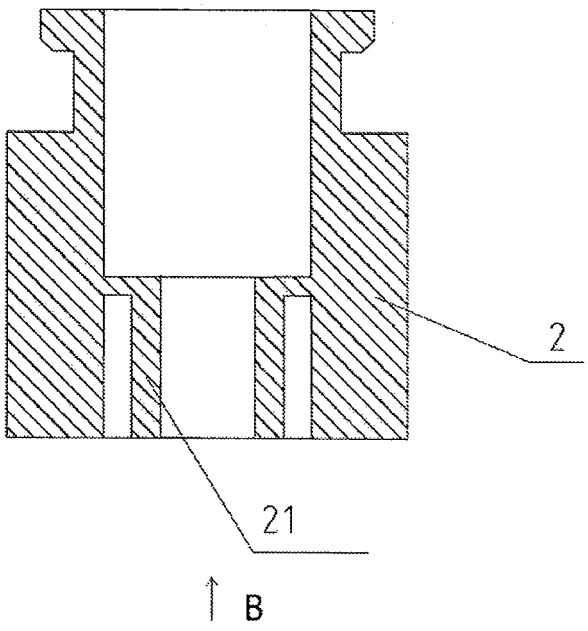

Fig. 10

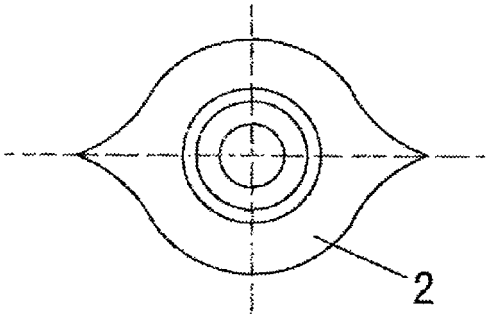

Fig. 11

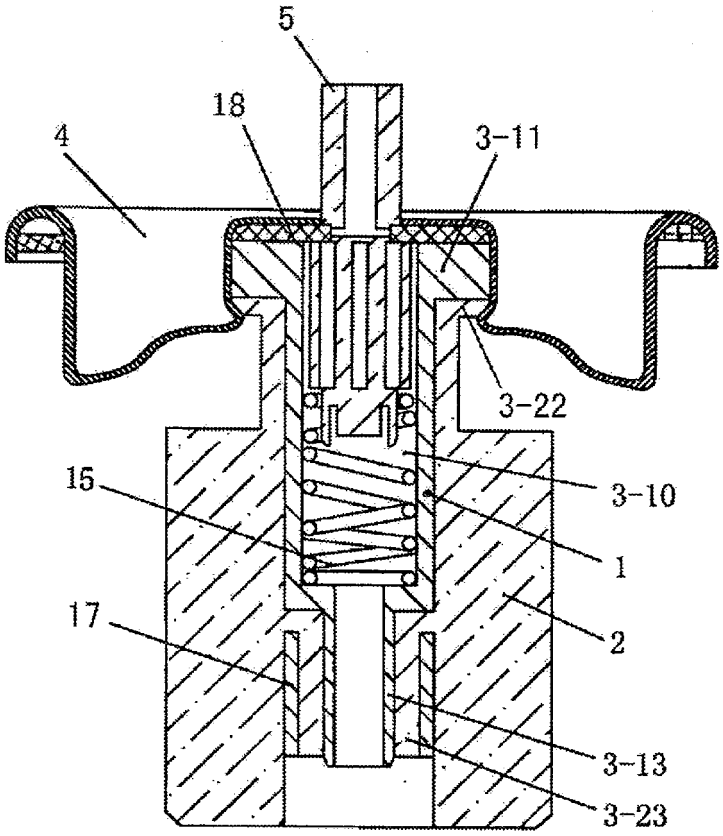

Fig. 12

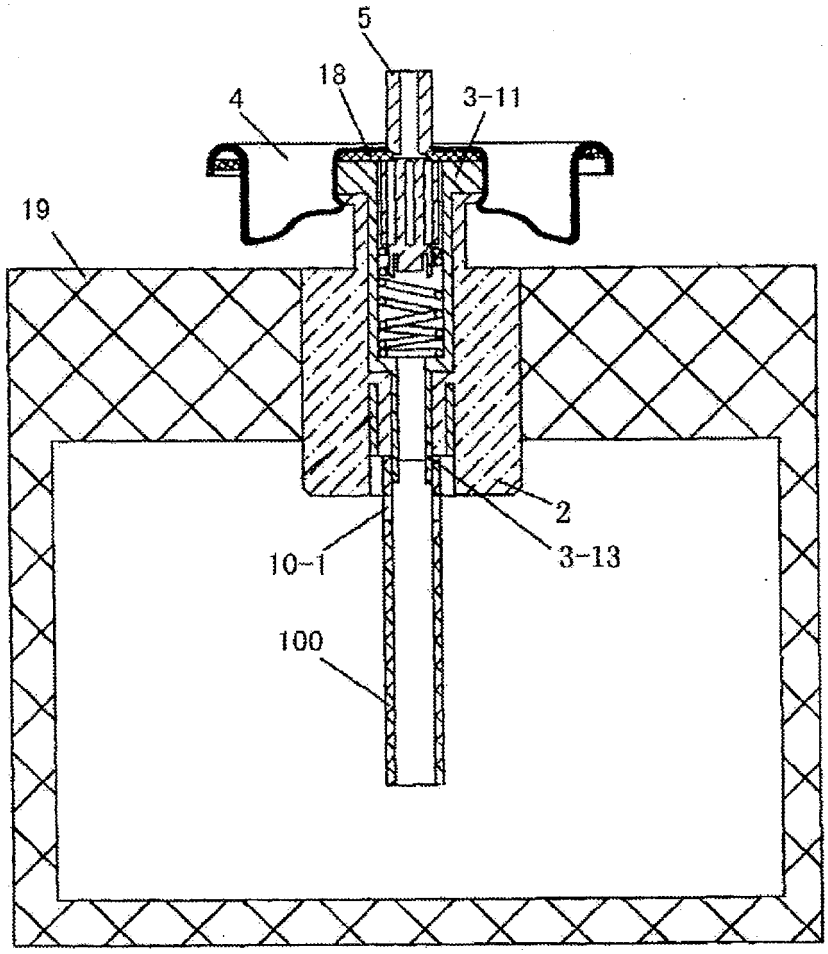

Fig. 13

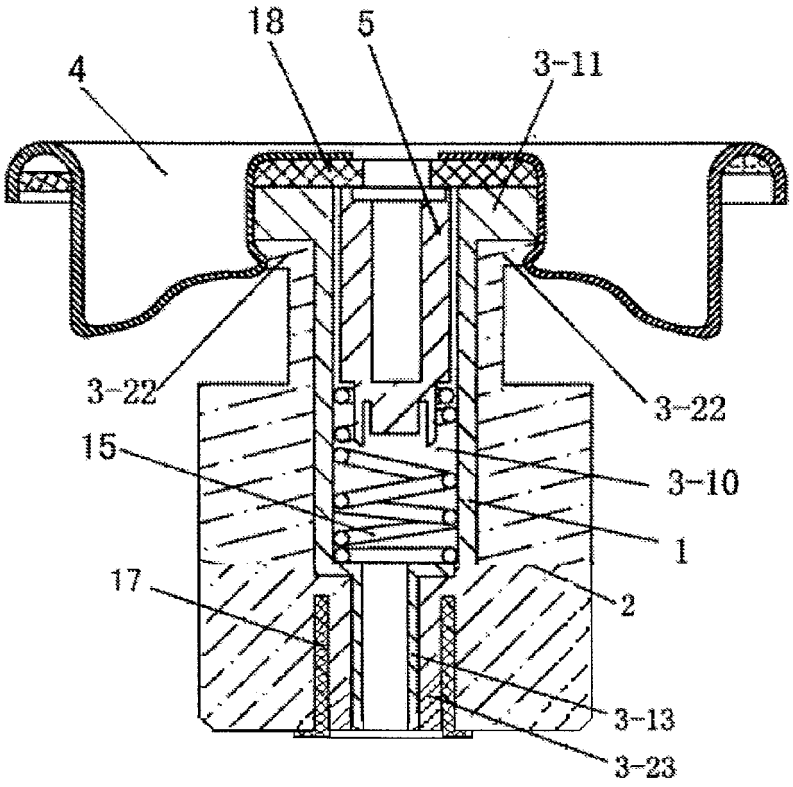

Fig. 14

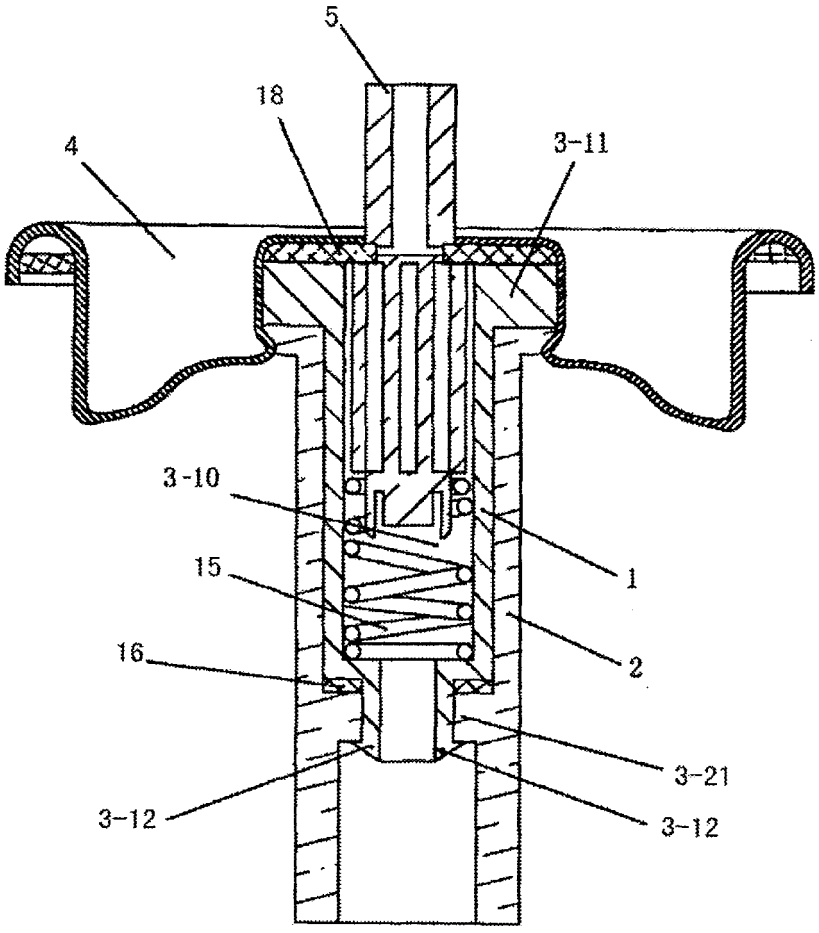

Fig. 15

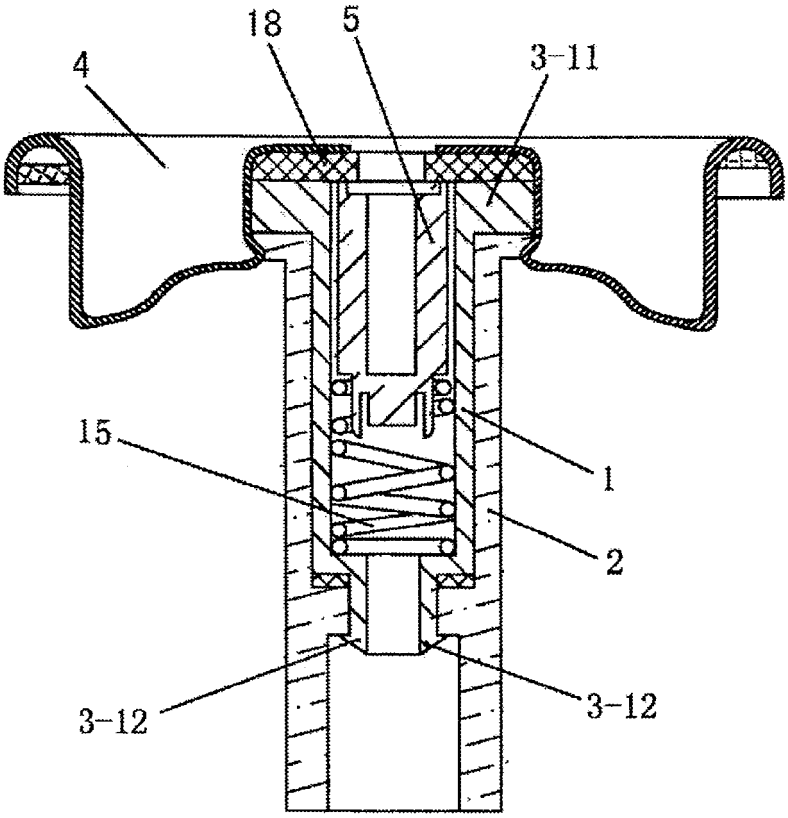

Fig. 16

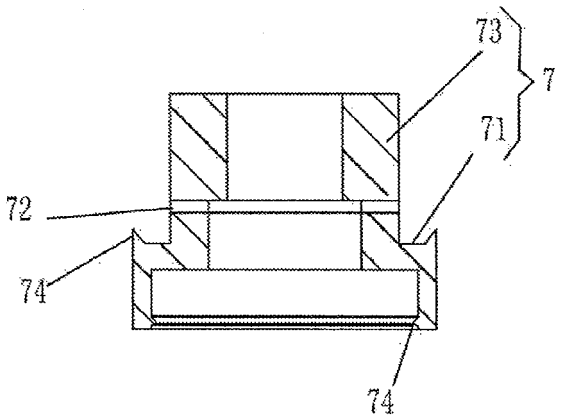

Fig. 17

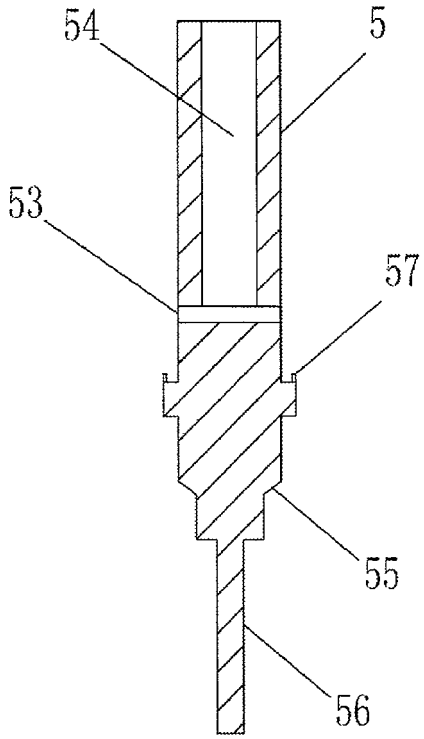

Fig. 18

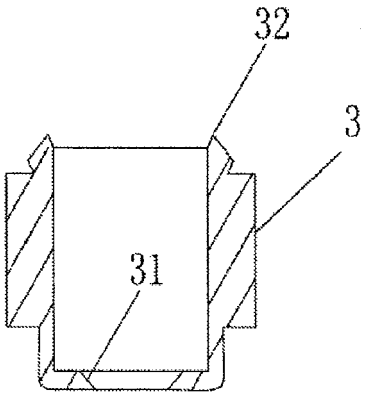

Fig. 19

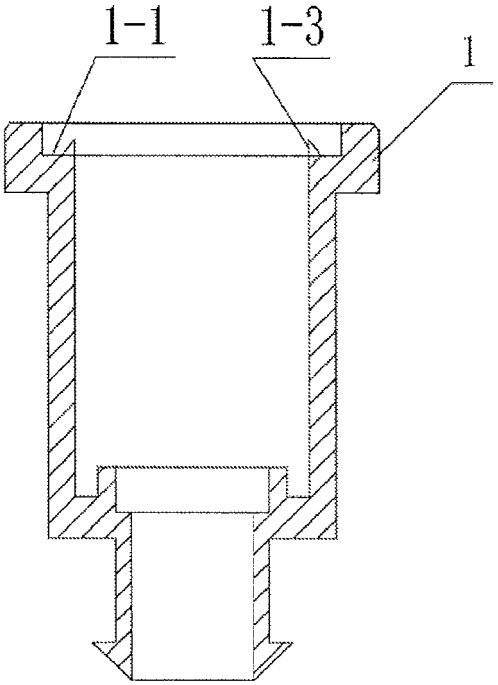

Fig. 20

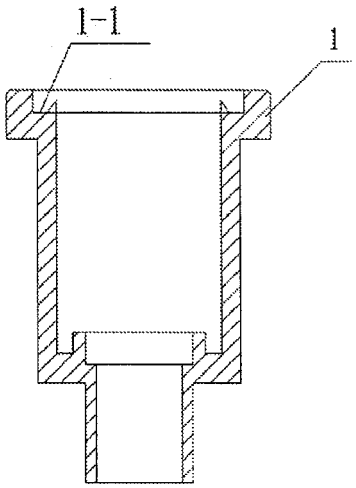

Fig. 21

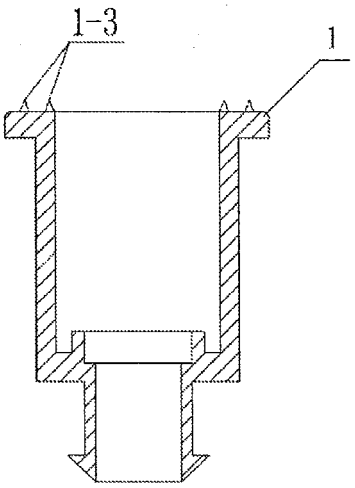

Fig. 22

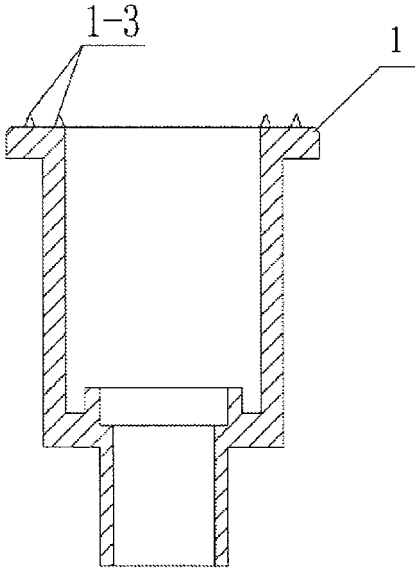

Fig. 23

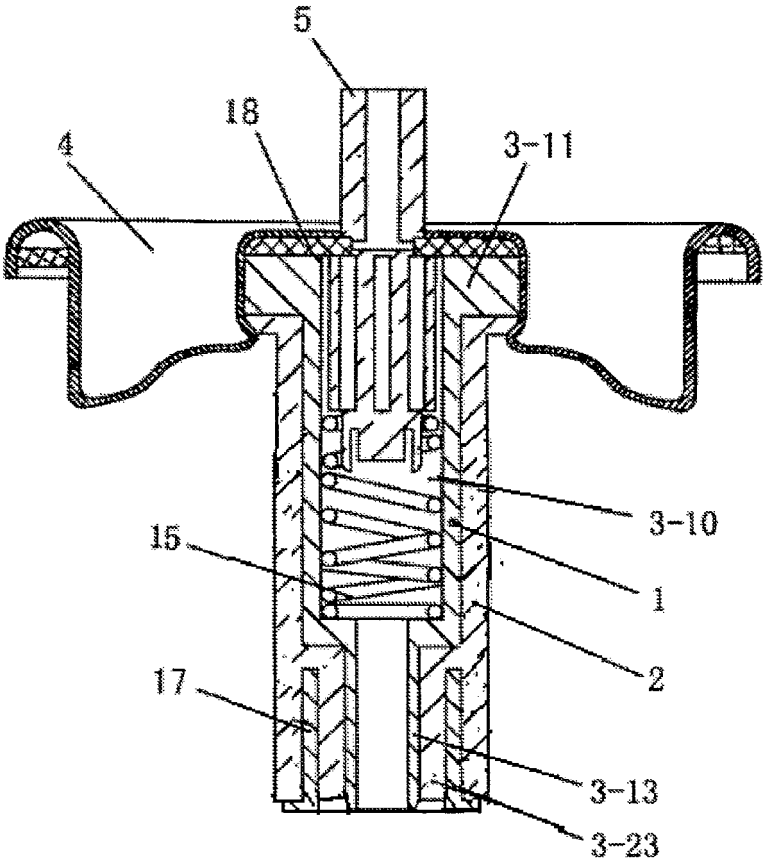

Fig. 24

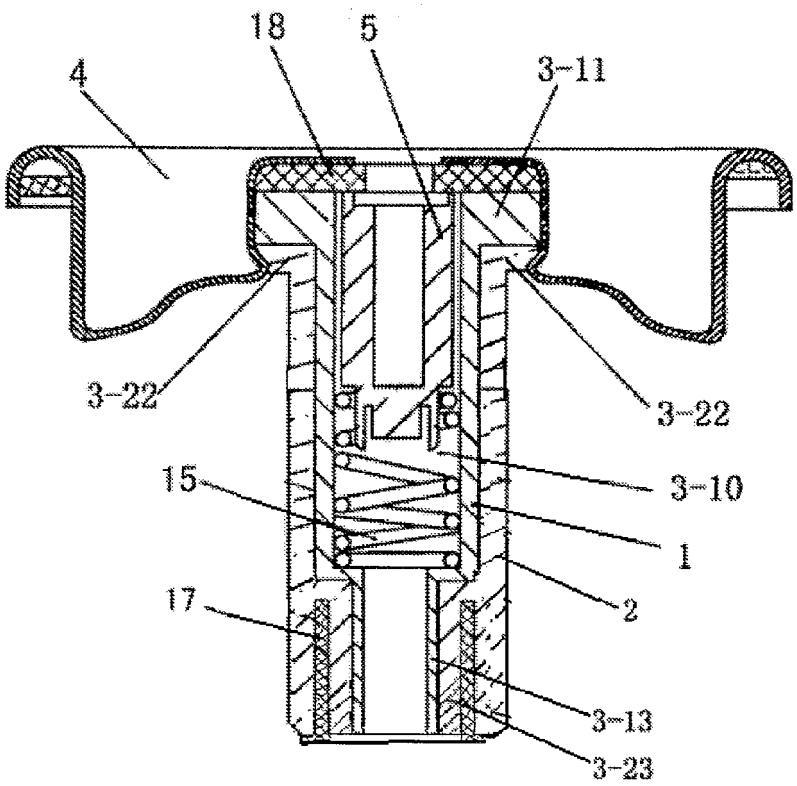

Fig. 25

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2013/077273

A. CLASSIFICATION OF SUBJECT MATTER

See the extra sheet

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)

IPC: B65D, B05B

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

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

CNPAT, CNKI, WPI, EPODOC: quantification, hole, seal, nozzle, opening, valve, dispenser, spring, inlet, outlet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 201010204 Y (YITIAN (NANJING) METAL PRODUCT CO., LTD.), 23 January 2008 (23.01.2008), see description, page 3, and figure 2	1, 6
X	CN 1013 37614 A (XU, Licai), 07 January 2009 (07.01.2009), see description, pages 2-4, and figure 1	9-10
A	CN 202492047 U (SHANGHAI EVEN PACKING PRODUCTS CO., LTD.), 17 October 2012 (17.10.2012), see the whole document	1-10
A	US 5901907 A (WELLA AG), 11 May 1999 (11.05.1999), see the whole document	1-10
A	GB 1597147 A (CARTER WALLACE INC.), 03 September 1981 (03.09.1981), see the whole document	1-10

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

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"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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
09 September 2013 (09.09.2013)	**03 October 2013 (03.10.2013)**
Name and mailing address of the ISA/CN: State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No.: (86-10) 62019451	Authorized officer **CHENG, Liang** Telephone No.: (86-10) **62085503**

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2013/077273

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 201010204 Y	23.01.2008	None	
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Form PCT/ISA/210 (patent family annex) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2013/077273

CONTINUATION OF SECOND SHEET:

A. CLASSIFICATION OF SUBJECT MATTER:

B65D 83/44 (2006.01) i

B65D 83/14 (2006.01) i

Form PCT/ISA/210 (extra sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- CN ZL200810020952 **[0002]**