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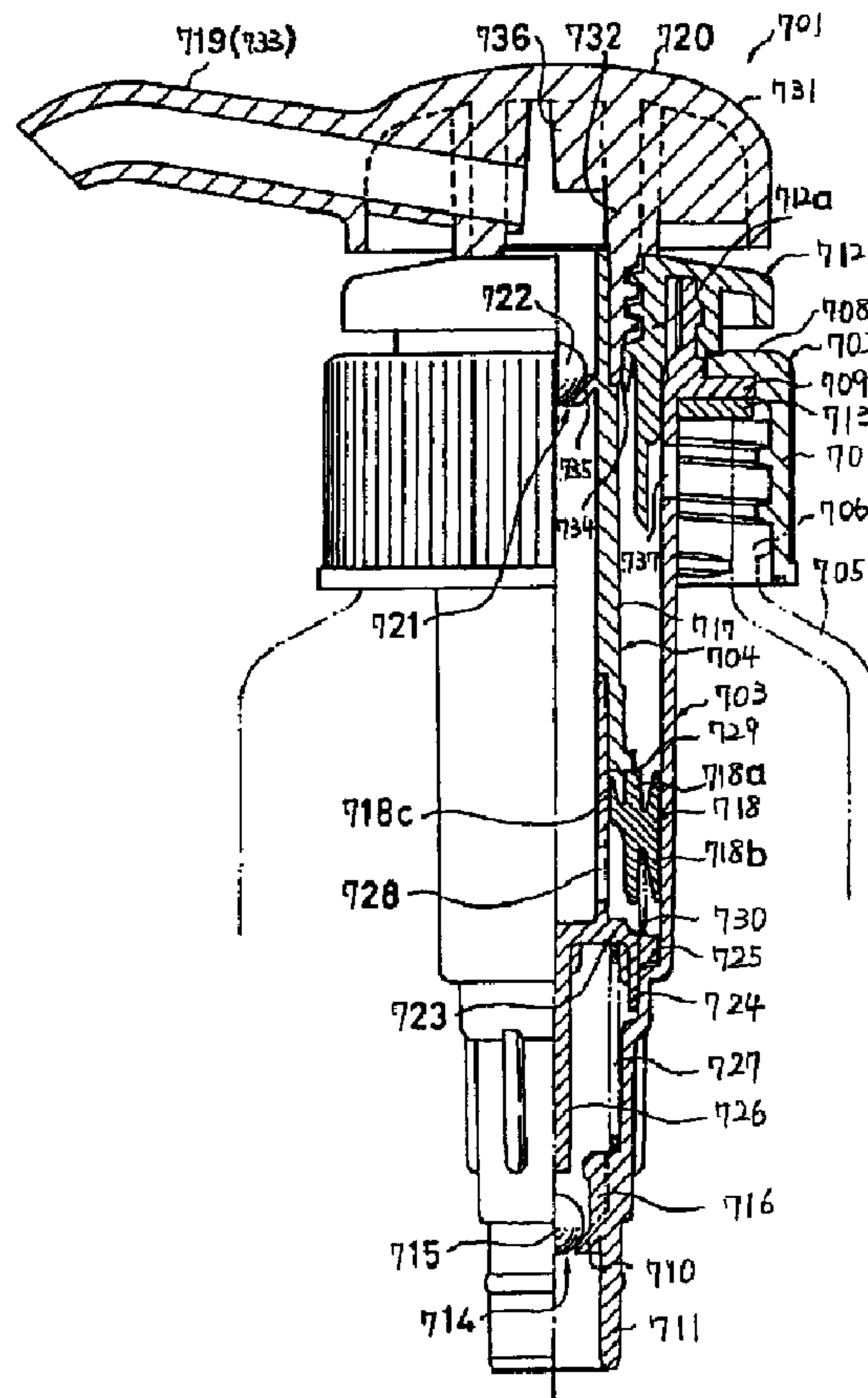
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(54) Title: LIQUID JET PUMP



(57) Abrégé/Abstract:

A liquid jetting pump of the present invention is constructed such that an intra container liquid is sucked into a cylinder through a suction valve by moving a vertically movable member up and down, and the intra cylinder liquid is jetted out of a nozzle through a



(57) **Abrégé(suite)/Abstract(continued):**

discharge valve from a stem. A plurality of ribs are protruded in a peripheral direction from a lower edge part within the cylinder. Engagement recessed portions are formed in inner parts of the upper surfaces of the ribs. A lower edge of a coil spring for biasing the vertically movable member is secured to each of the engagement recessed portions, thereby permitting a flow of liquid on both sides of the lower edge of the spring internally externally.

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ABSTRACT

A liquid jetting pump of the present invention is constructed such that an intra container liquid is sucked into a cylinder through a suction valve by moving a
5 vertically movable member up and down, and the intra cylinder liquid is jetted out of a nozzle through a discharge valve from a stem. A plurality of ribs are protruded in a peripheral direction from a lower edge part within the cylinder. Engagement recessed portions are
10 formed in inner parts of the upper surfaces of the ribs. A lower edge of a coil spring for biasing the vertically movable member is secured to each of the engagement recessed portions, thereby permitting a flow of liquid on both sides of the lower edge of the spring internally externally.

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LIQUID JET PUMP

Related Applications

This is a divisional of Canadian Patent Application No. 2,440,737 filed on September 22, 2003, which is a divisional of Canadian National Phase Patent
5 Application No. 2,186,614 filed on January 26, 1996.

Technical Field

[0001] The present invention relates generally to a variety of improvements of a liquid jet pump and, more particularly, to a pump suitable for jetting a liquid exhibiting a high viscosity.

10 Background Art

[0002] There is a push-down head type of pump as a liquid jetting pump. For example, as illustrated in FIG. 1, a well-known pump includes a mounting cap 102 fitted to an outer periphery of a neck portion 101 of a container 100 and a cylinder 104 fixed to an interior of the container through the cap and having a suction valve 103
15 provided in an inner lower edge part extending downward within the container. The pump also includes a stem 106 having an annular piston 105 fitted to the interior of the cylinder and protruding from a lower part of the outer periphery thereof while being so provided as to be vertically movable in an upward biased state within the cylinder. The pump further includes a head 108 with a nozzle 107, this head being provided in
20 continuation from an upper edge of the stem 28 and a coil spring 111 for always biasing upward a vertically movable member 110 constructed of a discharge valve 109 provided in an inner upper part of the stem, the stem and the push-down head. A liquid within the container is sucked into the cylinder 104 through the suction valve 103 by moving the vertically movable member up and down, and the intra cylinder liquid is
25 jetted out of the tip of the nozzle 107 through the discharge valve 109 from the stem.

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[0003] Further, an engagement member 112 fixedly fitted to an upper part of the cylinder is helically attached to an outer surface of the upper part of the vertically movable member in a state where the vertically movable member is pushed down. On this occasion, the lower edge part within the stem is liquid-tightly sealed by a
5 cylindrical member 13 fixed to the lower edge of the cylinder.

[0004] Moreover, the cylinder lower edge part is reducible in diameter, and a plurality of ribs 114 are provided in a peripheral direction on the inner surface of the diameter-reducible portion. The coil spring 111 is attached by securing its lower edge to the upper surface of each of the ribs 114 through a flange of the cylindrical member 113
10 and fitting its outer surface to the inner surface of the diameter-reducible portion.

[0005] In this type of conventional pump, when the vertically movable member is raised after jetting the liquid by pushing down the vertically movable member, as illustrated in FIG. 7, the liquid to be sucked into the cylinder is sucked zig-zag. If a viscosity of the liquid to be reserved is high, a suction quantity per unit time is small
15 (conspicuous with a viscosity as high as over 4000 cps), and, as a result, there is such an inconvenience that it takes much time from the vertically movable member to return to a maximum ascent position.

[0006] Some embodiments disclosed herein may obviate the defects inherent in the above prior art, to provide an excellent liquid jetting pump enabling the vertically
20 movable member to quickly return to the ascent position even when containing the high-viscosity liquid and easy to manufacture at a low cost by modifying a slight part of structure of this type of conventional pump.

[0007] Some embodiments disclosed herein may solve the technical problems that the liquid jetting pump is desired to obviate as will hereinafter be described.

25 [0008] According to the conventional pump, there are disadvantages in which the liquid remaining in the nozzle after jetting the liquid drops out of the tip thereof, and the liquid remaining at the tip edge part within the nozzle is to be dry-solidified. This

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dry-solidification is neither desirable in appearance nor preferable because of hindering the jetting operation of the liquid as the case may be.

[0009] Some embodiments disclosed herein may provide an excellent liquid jetting pump capable of eliminating the liquid leakage and, besides, preventing the dry-
5 solidification of the liquid as much as possible as well as providing an improvement of the prior art pump described above.

[0010] Further, there is provided a pump exhibiting such an advantage that the pump can be easily manufactured at the low cost because of being manufactured by modifying a slight part of the structure of the prior art pump.

10 [0011] A pump type liquid discharge container has the following defect. If the liquid contained has a relatively high viscosity, the liquid remaining within a nozzle hole after finishing the discharge of the liquid may drop out of the tip of the nozzle hole, and this liquid dropping may spoil a reliability of a consumer on the discharge container.

[0012] For eliminating the above defects, as disclosed in Japanese Utility Model
15 Laid-Open Number 1-17976, the present applicant has applied a liquid discharge container constructed such that the bar-like portion is erected from an inner lower part of the cylinder, the upper part of the bar-like portion is inserted into the stem constituting a part of the operating member, the bar-like portion is inserted long into the stem when pushing down the operating member, the stem is negative-pressurized
20 while removing the bar-like portion from within the stem when the operating member rises, and the liquid within the nozzle of the push-down head fitted to the upper edge of the stem can be thus sucked back.

[0013] In the above liquid discharge container, when the operating member is raised, the bar-like portion erecting from within the lower part of the cylinder is
25 removed from within the stem, and the intra nozzle liquid is sucked back by the negative-pressuring the interior of the stem due to the removable thereof. Hence, if the operating member is insufficiently pushed down, a length of insertion of the bar-like

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portion inserted into the stem is also short. Accordingly, there is also insufficient negative-pressurization in the interior of the stem due to the removable of the bar-like portion when the operating member is raised, and there exists a defect in which the intra nozzle liquid is insufficiently sucked back due to the insufficient negative-
5 pressurization.

[0014] Some embodiments disclosed herein may obviate such a defect.

Disclosure of Invention

Some embodiments disclosed herein may provide a liquid jetting pump comprising: a mounting cap fitted to a container neck portion; a cylinder fixed to a
10 container through said cap and including a suction valve provided in a lower edge part extending downward into said container; a stem having its lower edge surface closed and provided so that said stem is vertically movable in a central portion within said cylinder in an upward biased state and including a discharge valve with a valve hole so formed in an upper part of the interior as to be closed by a valve member
15 vertically moved by a liquid pressure; an annular piston fitted to a lower edge part of the outer periphery of said stem as to be vertically movable at a predetermined stroke, having its outer peripheral surface slidably fitted to the inner surface of said cylinder and so provided as to open or close a through-hole formed in the lower edge part of said stem; and a push-down head, with a nozzle, so provided in continuation
20 from an upper edge of said stem as to be vertically movable above said mounting cap, a liquid within said cylinder being led into said stem via said opened through-hole and jetted out of said nozzle through a discharge valve by pushing down said push-down head, and the liquid within said container being sucked into said cylinder through a suction valve by negative-pressurizing the interior of said cylinder when
25 said push-down head is raised, wherein said annular piston is always biased upward with respect to said stem, and said through-hole is so formed as to be closable only in a maximum ascent position of said stem.

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[0086] According to the present invention, there is provided an excellent liquid jetting pump capable of preventing the liquid dropping and, besides, the liquid dry-solidification. According to the present invention, in a liquid jetting pump comprising: a mounting cap fitted to a container neck portion; a cylinder fixed to a container through the cap and including a suction valve provided in a lower edge part extending downward into the container; a stem having its lower edge surface closed and provided so that the stem is vertically movable in a central portion within the cylinder in an upward biased state and including a discharge valve with a valve hole so formed in an upper part of the interior as to be closed by a valve member vertically moved by a liquid pressure; an annular piston so fitted to a lower edge part of the outer periphery of the stem as to be vertically movable at a predetermined stroke, having its outer peripheral surface slidably fitted to the inner surface of the cylinder and so provided as to open or close a through-hole formed in the lower edge part of the stem; and a push-down head, with a nozzle, so provided in continuation from an upper edge of the stem as to be vertically movable above the mounting cap, a liquid within the cylinder is led into the stem via the opened through-hole and jetted out of the nozzle through a discharge valve by pushing down the push-down head, and the liquid within the container is sucked into the cylinder through a suction valve by negative-pressurizing the interior of the cylinder when the push-down head is raised, there is provided an improvement characterized in that the annular piston is always biased upward with respect to the stem, and the through-hole is so formed as to be closable only in a maximum ascent position of the stem.

[0087] Further, it is preferred that the discharge valve member has a vertical stroke that is regulated so that $V_b - V_c$ is equal to or larger than V_a , where V_a is the volumetric capacity of the nozzle, V_b is the volumetric capacity of a liquid passageway portion where the discharge valve member is vertically movable, and V_c is the volume of the discharge valve member.

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[0088] It is used while mounted in the container containing the liquid exhibiting the viscosity. For example, the head is raised by detaching the helical fitted portion of the vertical movable member from the state of FIG. 2, and, when pushing down the raised head, the interior of the cylinder is pressurized. The liquid within the cylinder
5 then passes via the opened through-hole, flows from the stem enough to open the discharge valve and is jetted outside out of the nozzle. Moreover, on this occasion, the discharge valve member is through up to the lower surface of the engagement plate.

[0089] Subsequently, when releasing the head from being depressed, the vertically movable member rises by the resilient force of the coil spring, and the interior
10 of the cylinder is negative-pressurized, with the result that the discharge valve member is lowered relatively to the vertically movable member enough to close the valve hole, thereby closing the discharge valve. In the meantime, the liquid within the passageway where the discharge valve member moves up and down flows back into the stem disposed upstream of the valve seat, and correspondingly the liquid in the
15 nozzle flows back into the above passageway. Also, the liquid within the stem passes via the through-hole and flows back into the cylinder. On the other hand, the suction valve is opened by negative-pressurizing the interior of the cylinder, and the intra container liquid is led into the cylinder through the suction valve.

[0090] Even after the discharge valve has been closed, the liquid in the container
20 is continuously led into the cylinder till the stem reaches the maximum ascent position. In the maximum ascent position of the stem, the annular piston engages with the lower surface of the inner cylinder of the engagement member and then descends relatively against the biasing force of the coil spring, and the through hole is closed.

Brief Description of Drawings

25 FIG. 1 is a side view with some portion cut away, showing a prior art pump;

FIG. 2 is a sectional view showing one embodiment of the present invention;

FIG. 3 is an explanatory view showing the push-down head in the same embodiment;

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FIG. 4 is an explanatory sectional view when pushing down the head in the same embodiment;

FIG. 5 is an explanatory sectional view when the head rises in the same embodiment;

FIG. 6 is an explanatory sectional view illustrating the head maximum ascent position
5 in the same embodiment.

Best Mode For Carrying Out The Invention

[0263] One embodiment of the present invention will hereinafter be described with reference to the drawings.

[0264] FIGS. 2 to 6 illustrate other embodiment of the present invention,
10 wherein the numeral 701 designates a liquid jet pump. The pump 701 includes a mounting cap 702, a cylinder 703 and a vertically movable member 704.

[0265] The mounting cap 702 serves to fix the cylinder 703 to a container 705 and is constructed such that an inward flange-like top wall 708 extends from an upper edge of a peripheral wall 707 helically-fitted to an outer periphery of a container cap
15 fitted neck portion 706.

[0266] The cylinder 703 is fixed to the container 705 through the mounting cap 702, and the lower edge portion thereof extends inwardly of the container.

[0267] In accordance with this embodiment, the cylinder 703 has a flange 709 taking a cylindrical shape with its upper and lower edge surfaces opened, wherein the
20 lower portion is reducible in diameter at three stages, an outward flange 709 is protruded from the outer peripheral upper portion, and a flange-like valve seat 710 protruding inward downward in the inner lower edge portion. Also, a fitting cylindrical portion 711 for fitting a suction pipe is formed in the lower portion of the valve seat 710. The upper edge of a suction pipe (unillustrated) is attached to this fitting cylindrical
25 portion 711, and a lower portion thereof extends downward in the container.

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[0268] Further, an engagement member 712 for engaging the vertically movable member 704 in the push-down state is fixedly fitted to the upper edge thereof. The engagement member 712 is constructed such that the fitting cylindrical portion fitted via a rugged engagement element to the outer periphery of the upper edge of the cylinder 703 perpendicularly extends from a doughnut-like top plate, and an inner cylinder 712a fitted to the upper edge of the inner peripheral of the cylinder 703 extends perpendicularly from the inner peripheral edge of the top plate. An inner cylinder 712a and an upper edge inner surface of the cylinder 703 are prevented from being turned round by the engagement of vertical protrusions with each other, and a thread for helical fitting of the vertically movable member is formed along the inner periphery of the upper portion of the inner cylinder 712a.

[0269] Then, the outward flange 709 is placed via a packing 713 on the upper surface of the container neck portion 706 and is caught by a top wall 708 of the mounting cap 702 helically fitted to the outer periphery of the neck portion and by the upper surface of the container neck portion 706.

[0270] Also, the suction valve 714 is provided in the inner lower portion of the cylinder 703. This suction valve 714 is constructed of the valve seat 710 and a ball-like valve member 715 placed on the valve seat 710. Further, a plurality of engagement ribs 716 are formed in the peripheral direction along the peripheral wall of the valve seat 710, and the valve member 715 is engaged so that the valve member does not come off upward any more due to the protrusions formed on the inner side surface of the upper edges of the respective engagement ribs 716, thus regulating the vertical stroke.

[0271] The vertically movable member 704 includes a stem 717, an annular piston 718, a push-down head 720 with a nozzle 719 and a discharge valve 721.

[0272] The stem 717 with its lower edge surface closed is so provided as to be vertically movable biased state in the central portion within the cylinder 703 and includes a discharge valve 427 in the upper portion of the interior thereof. This

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discharge valve 721 is constructed such that a valve hole formed in the inner upper portion is clogged by a valve member vertically movable by the liquid pressure.

[0273] According to this embodiment, the stem 717 takes the cylindrical shape with the lower edge surface closed and has a flange 723 protruding outward from the lower edge of the outer periphery, and a vertically descending wall 724 extends vertically from the outer peripheral edge of the flange 723 with a gap from the cylinder inner surface. Further, a plurality of protrusions 725 are protruded in the peripheral direction from the outer surface upper portion of the vertically descending wall 724. There is a slight gap between the outer peripheral surface of each protrusion 725 and the cylinder inner surface, and this functions to compensate a trajectory thereof if a lateral deflection is caused when the stem 717 moves up and down. Further, a bar-like protrusion 726 extends perpendicularly from the central portion of the rear surface of the stem bottom wall, and its lower edge extends down to the position of the upper edge of each engagement rib 716 of the cylinder 703, which functions to perform the push-down operation if the suction valve 715 is caught between the upper edge protrusions of the respective engagement ribs 716. Note the stem 717 is composed of the two members in this embodiment.

[0274] Moreover, a coil spring 727 is interposed between the lower surface of the flange 723 and an upward stepped portion formed on the inner surface of the cylinder 703 with respect to the upper edge surface portion of the engagement ribs 716, and the stem 717 is thereby always biased upward.

[0275] In the annular piston 718, the stem 717 is so fitted to the outer peripheral lower edge as to be vertically movable at the predetermined stroke, the outer peripheral edge thereof is slidably attached to the cylinder inner surface, and a through-hole 728 holed in the lower edge portion of the stem 717 is so provided as to be openable and closable.

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[0276] In accordance with this embodiment, there is protruded an outside slide portion 718b taking a circular arc shape in section with its upper portion protruding outward from the outer peripheral surface of a cylindrical proximal portion 718a, and an upward skirt-like inside slide portion 718c ascending obliquely is protruded from the inner peripheral surface of the proximal portion 718a, thus constituting the annular piston 718. On the other hand, a downward stepped portion 729 is formed in a predetermined position above the outward flange 723 along the outer periphery of the stem 717, a through-hole 728 is formed in the stem peripheral wall between the stepped portion 729 and the outward flange 723.

10 [0277] Then, the outside slide portion 718b is liquid-tightly slidably fitted to the inner surface of the cylinder 703, and the inside slide portion is liquid-tightly slidably fitted to the outer periphery of the stem 717. Further, there is vertically movably fitted to the stem 717 at the predetermined stroke from a position where the upper surface of the proximal portion 718a impinges on the lower surface of the stepped portion 729 to a position where the lower surface of the proximal portion 718a impinges on the upper surface of the flange 723.

[0278] According to the present invention, this annular piston 718 is so constructed as to be always biased upward with respect to the stem 717, and the through-hole 728 is closable only in the maximum ascent position of the stem.

20 [0279] In accordance with this embodiment, the coil spring 730 is interposed between the upper surface of each protrusion 725 of the stem 717 and the lower joint surface of the outside slide portion 718b to the proximal portion 718a in the annular piston 718, whereby the upper surface of the proximal portion 718a always impinges on the lower surface of the stepped portion 729. Accordingly, the interior of the cylinder communicates via the through-hole 728 with the interior of the stem at all times. Further, this coil spring 730 is selected to have a resilient force smaller than the coil spring 727 for biasing upward the stem 717. When the stem 717 is pushed upward, the upper edge of the proximal portion 718a of the annular piston 718

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impinges and engages with the lower surface of the inner cylinder 712a of the engagement member 712. On the other hand, the stem 717 is raised up to a position where the lower surface of the proximal portion 718a closely contacts the upper surface of the flange 723 and is then engaged therewith. Accordingly, the through-
5 hole 728 is closed in the stem maximum ascent position.

[0280] Note that the numeral 737 represents a through-hole, formed in the cylinder, for taking in the outside air, the outside air is taken into the container negative-pressurized via this through-hole 737 from between the stem 717 and the inner cylinder 712a when the vertically movable member rises, and it is shut off by the
10 annular piston when the stem is in the maximum ascent position.

[0281] The push-down head 720 is so provided in continuation from the upper edge of the stem 717 as to be vertically movable above the mounting cap 702. In accordance with this embodiment, the push-down head 720 includes a cylindrical casing 731 with an opening formed in the lower edge surface and a peripheral wall
15 perpendicularly extending from the peripheral edge of the top wall, and a lower portion of a vertical cylinder 732 vertically extending from the center of the top wall lower surface of the casing 731 is attached to the outer peripheral upper edge of the stem 717, thus fixing it to the stem 717. Further, a horizontal cylinder 733 with its proximal portion opened to the upper front surface of the vertical cylinder 732
20 penetrates the casing peripheral wall and protrudes forward therefrom, thus forming this horizontal cylinder 733 as a nozzle 719. The nozzle 719 is constructed so that its proximal portion ascends obliquely forward, while its tip descends obliquely. With this construction, the liquid dropping can be prevented more surely.

[0282] Furthermore, a thread formed along the outer periphery of the vertical
25 cylinder 732 with respect to a portion protruding downward from the casing 731 meshes with the thread of the engagement member 712 when pushing down the vertically movable member 704 and is thus made possible of engagement therewith in the state where the vertically movable member 704 is pushed down. Also, on this occasion, the construction is such that the outer surface of the vertically descending wall 724

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protruding from the stem 717 is liquid-tightly fitted to the inner surface of a reducible diameter portion formed at the lower portion of the cylinder peripheral wall. Further, the outer peripheral lower edge of the vertically cylinder 732 is liquid-tightly fitted to the inner periphery of a downward skirt-like annular protruded piece 734 provided on the
5 inner surface of an inner cylinder 712a of the engagement member 712.

[0283] In the discharge valve 721, the valve member 722 for closing the valve hole formed in the inner upper portion of the stem 717 is so provided as to be vertically movable by the liquid pressure.

[0284] In accordance with this embodiment, a flange-like valve seat 735
10 descending inward obliquely is protruded at the upper portion within the stem 717, and then a valve hole is formed in the central portion thereof. A ball-like valve member 722 is placed on the valve seat 735 to clog the valve hole, thus constituting the discharge valve 721. Further, the valve member 722 is so formed as to be vertically movable up to a position where it impinges on the lower surface of an engagement plate 736
15 extending perpendicularly from the top wall of the casing 731.

[0285] The pump according to the present invention is utilized for jetting the liquid exhibiting the high viscosity on the order of, e.g., 500 cps - 15000 cps. When using the high viscosity liquid as described above, it hardly happens that the discharge valve member 722 pushed up by the liquid pressure immediately drops down to the
20 valve seat 735 by a self-weight thereof. The discharge valve member vertically moves substantially along the flow of liquid, although slightly different depending on the liquid viscosity and a weight of the valve member. Accordingly, there is seen no remarkable error between a flow rate of the liquid and a moving velocity of the valve member.

[0286] Further, in accordance with this embodiment, let V_a be the volumetric
25 capacity of the nozzle 719, let V_b be the volumetric capacity of a liquid passageway where the discharge valve member 722 is vertically movable, and let V_c be the volume of the discharge valve member 722, wherein the vertical stroke of the discharge valve member 722 is regulated so that $V_b - V_c$ is equal to or larger than V_a . An actual

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vertical stroke of the discharge valve member 722 based on this regulation is, though different depending on the length and inside diameter of the nozzle and the inside diameter of the stem 717, on the order of 5 mm - 30 mm larger than in the conventional pump constructed by putting the ball valve on the valve seat. In particular, the actual vertical stroke thereof is preferably 10 mm or above.

[0287] Then, when the vertically movable member 704 is raised after pouring the liquid by pushing down the vertically movable member 704, the liquid in the stem 717 flows back via the through-hole 728 into the cylinder 703 negative-pressurized. Further, the liquid in the passageway where the discharge valve member 722 flows back into the stem 717, and, besides, the liquid in the nozzle 719 flows back into the above passageway. On this occasion, if $V_b - V_c$ is equal to or larger than V_a , the liquid in the nozzle flows back substantially into the above passageway.

[0288] It is to be noted that the respective members are properly selectively composed of synthetic resins, metals and materials such as particularly elastomer exhibiting an elasticity.

[0289] As discussed above, the pump according to the present invention is constructed so that the annular piston is always biased upward with respect to the stem, and the through-hole is closable only in the stem maximum ascent position. Hence, when using the pump of the present invention for discharging the liquid exhibiting the viscosity, the intra stem liquid flows back into the cylinder via the through-hole till the discharge valve is closed when the head is raised after jetting the liquid by pushing down the push-down head. Correspondingly, the liquid in the passageway where the discharge valve member moves up and down flows back into the stem, and further the intra nozzle liquid flows back into the above passageway. Hence it is possible to obviate the liquid dropping out of the nozzle tip and prevent the liquid dry-solidification as much as possible.

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[0290] Besides, as in the prior art, the through-hole is clogged by the annular piston in the maximum ascent position even when the container in use is turned over carelessly, the pump has such an effect that the liquid leakage from the nozzle tip can be prevented as much as possible.

- 5 [0291] Further, the pump exhibits such advantages that the pump can be constructed by modifying a part of structure of this kind of conventional pump and is therefore easily manufactured at a low cost.

[0292] Moreover, let V_a be the volumetric capacity of the nozzle, let V_b be the volumetric capacity of the liquid passageway where the discharge valve member is
10 vertically movable, and let V_c be the volume of the discharge valve member, wherein the vertical stroke of the discharge valve member is regulated so that $V_b - V_c$ is equal to or larger than V_a . With this arrangement, substantially the whole amount of liquid in the nozzle blows back into the passageway where the discharge valve member moves up and down, and it is therefore possible to prevent the liquid dropping and the liquid
15 dry-solidification more preferably.

Industrial Applicability

[0343] The liquid jetting pump according to the present invention can be, because of its having been improved as discussed above, utilized suitably for jetting a variety of liquids ranging from a liquid cosmetic material and is therefore high in terms
20 of the applicability.

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CLAIMS:

1. A liquid jetting pump comprising:

a mounting cap fitted to a container neck portion;

5 a cylinder fixed to a container through said cap and including a suction valve provided in a lower edge part extending downward into said container;

a stem having its lower edge surface closed and provided so that said stem is vertically movable in a central portion within said cylinder in an upward biased state and including a discharge valve with a valve hole so formed in an upper part of the interior as to be closed by a valve member vertically moved by a liquid pressure;

10 an annular piston fitted to a lower edge part of the outer periphery of said stem as to be vertically movable at a predetermined stroke, having its outer peripheral surface slidably fitted to the inner surface of said cylinder and so provided as to open or close a through-hole formed in the lower edge part of said stem; and

15 a push-down head, with a nozzle, so provided in continuation from an upper edge of said stem as to be vertically movable above said mounting cap,

a liquid within said cylinder being led into said stem via said opened through-hole and jetted out of said nozzle through a discharge valve by pushing down said push-down head, and the liquid within said container being sucked into said cylinder through a suction valve by negative-pressurizing the interior of said cylinder
20 when said push-down head is raised,

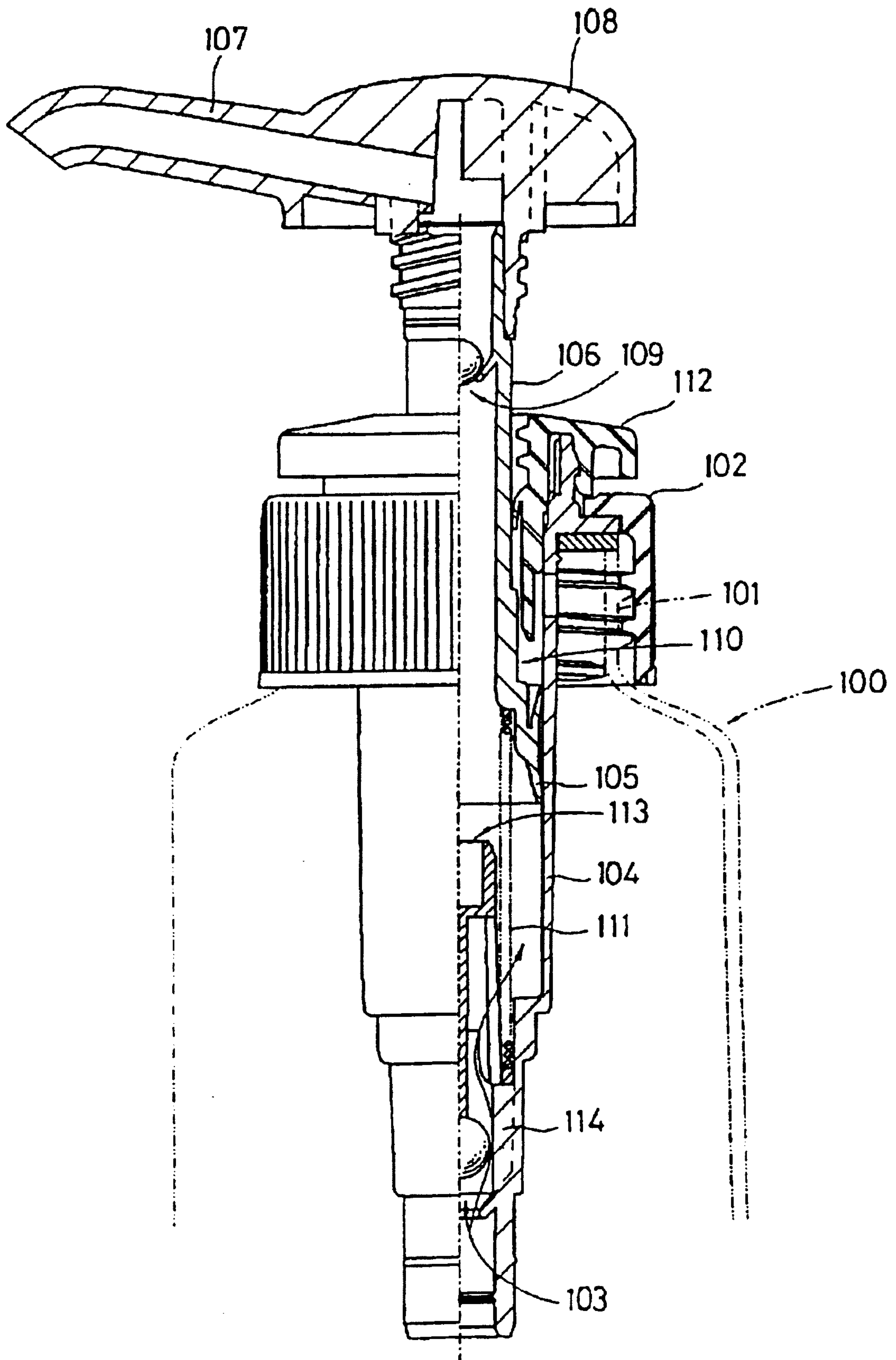
wherein said annular piston is always biased upward with respect to said stem, and said through-hole is so formed as to be closable only in a maximum ascent position of said stem.

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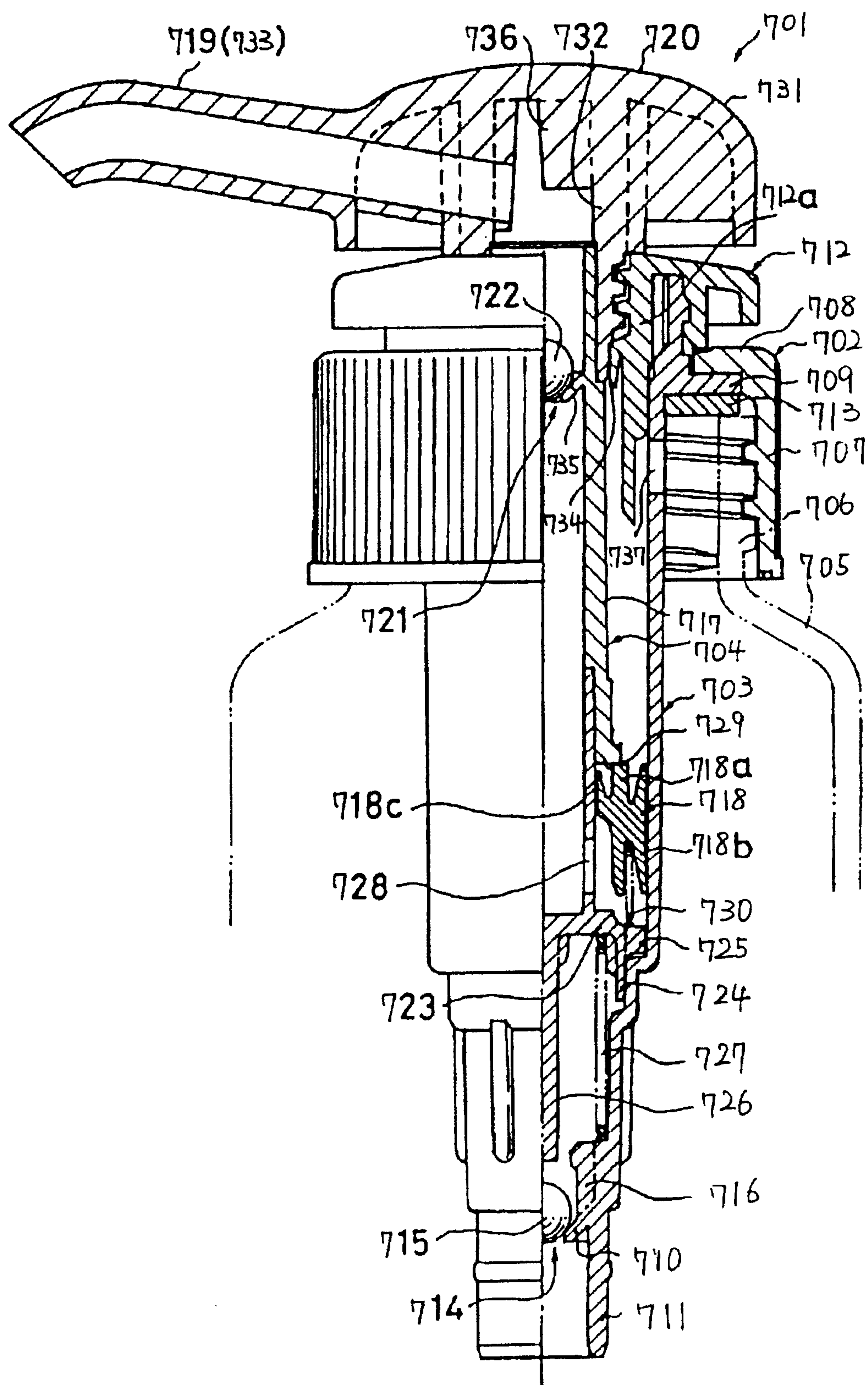
2. A liquid jetting pump according to claim 1, wherein said discharge valve member has a vertical stroke that is regulated so that $V_b - V_c$ is equal to or larger than V_a , wherein V_a is the volumetric capacity of said nozzle, V_b is the volumetric capacity of a liquid passageway portion where said discharge valve member is vertically
- 5 movable, and V_c is the volume of said discharge valve member.

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FIG. 1
(Prior Art)



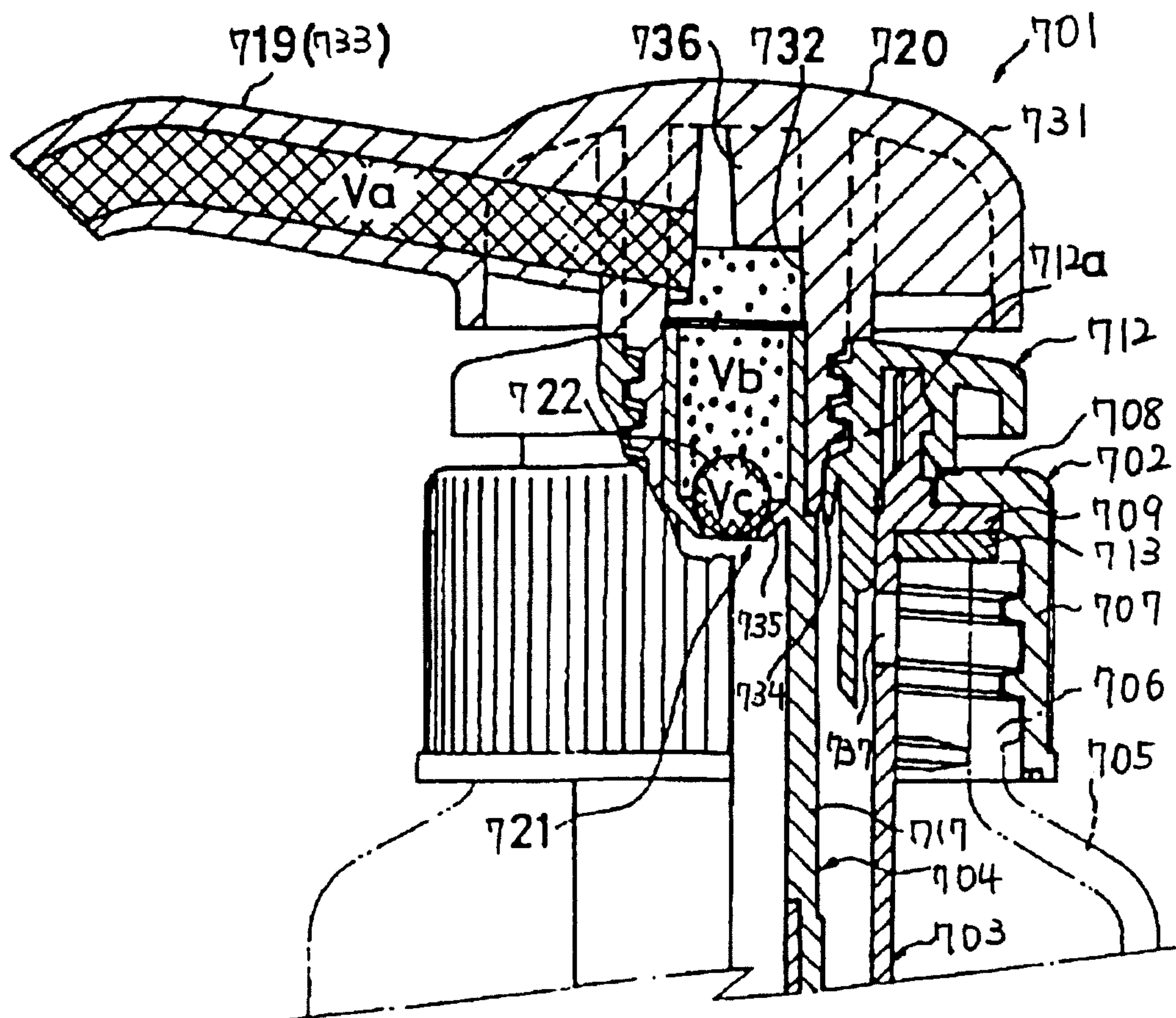
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FIG. 2



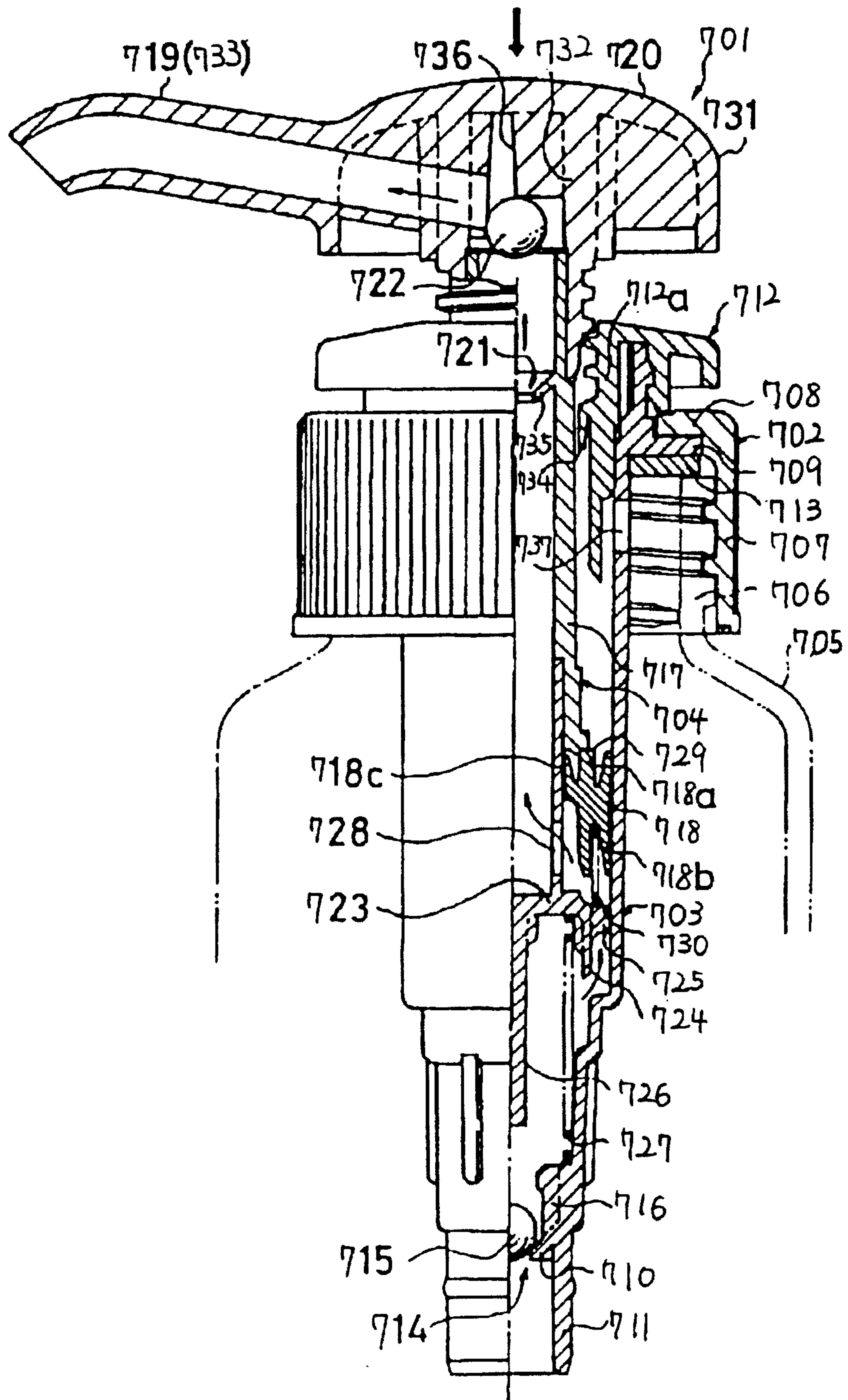
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FIG. 3



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FIG. 4



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FIG. 5

