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(54) **TRIGGER DISPENSER**

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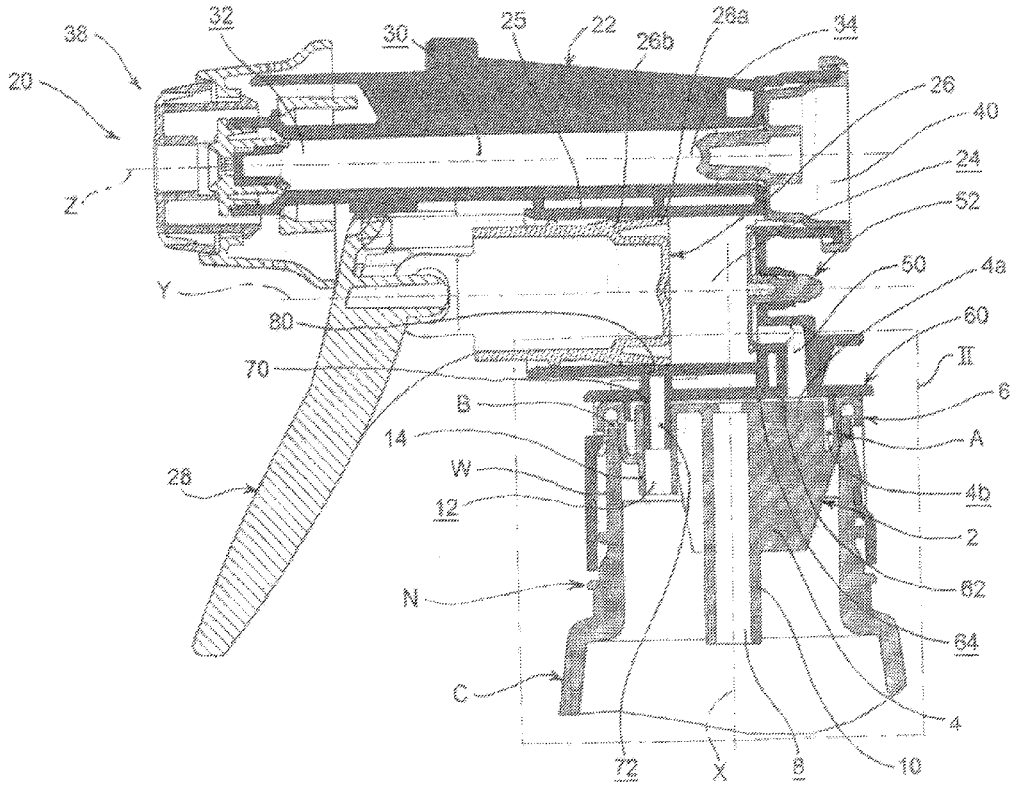
(57) **ABSTRACT**

A trigger dispenser device (**1**) envisages a secondary liquid aspiration duct (**50**) in communication with the dispenser duct, and a primary liquid aspiration duct (**8**) in communication with the container, off-axis with each other. Between these, a joining compartment (**64**) is provided communicating upstream with the primary liquid aspiration duct (**8**) and communicating downstream with the secondary liquid aspiration duct (**50**) to form the fluidic connection between them. In particular, the container (C) is of the type with built-in suction pipe.



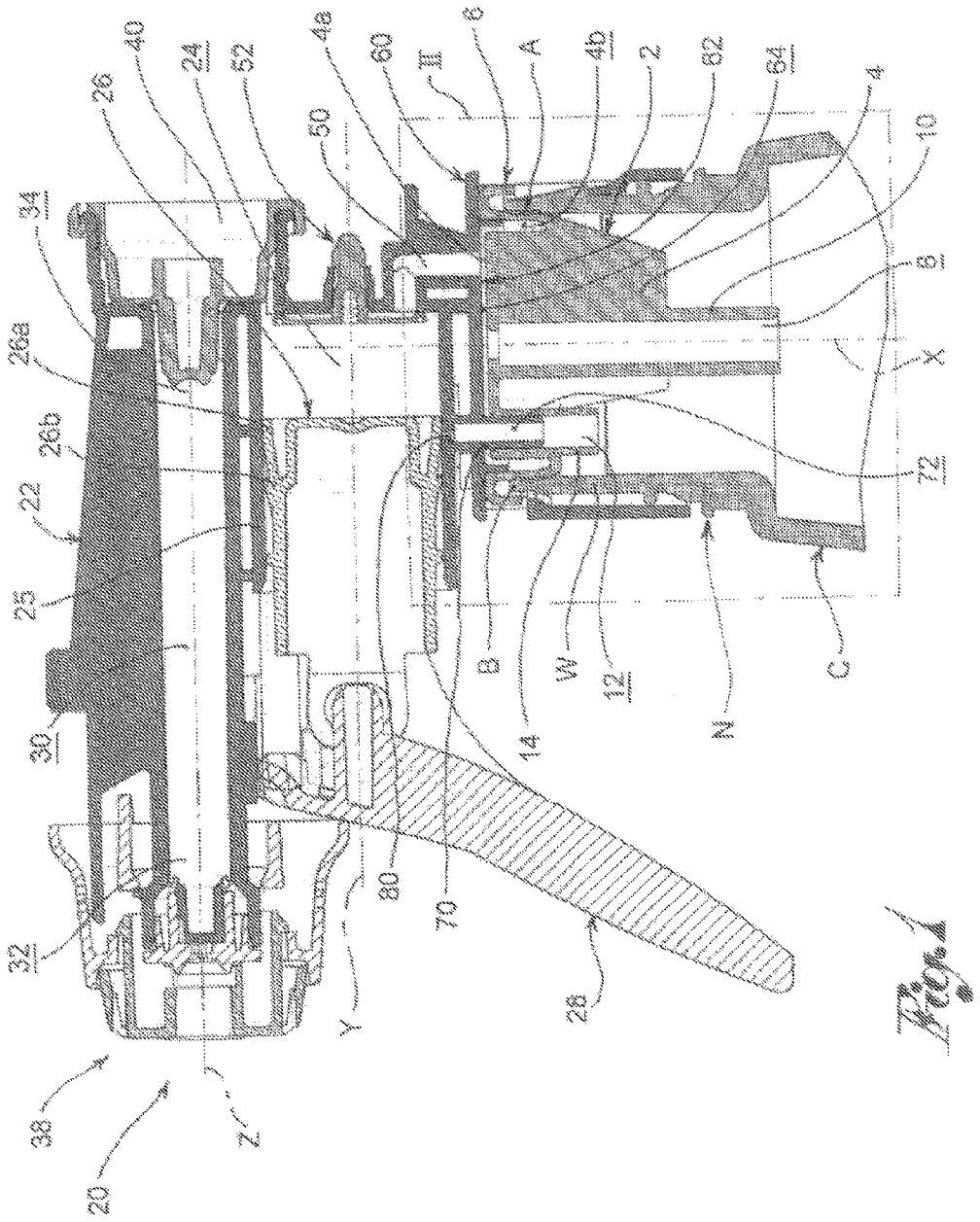

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Fig. 1

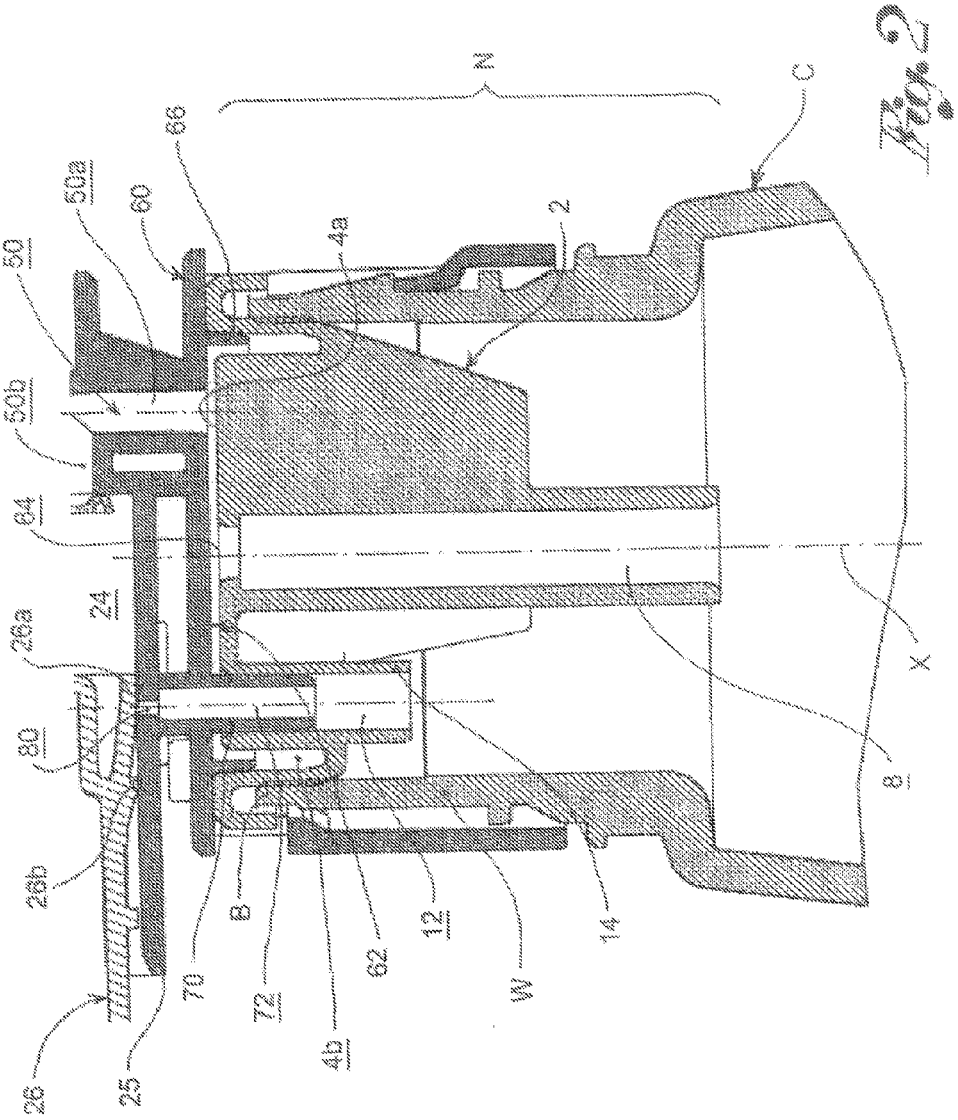
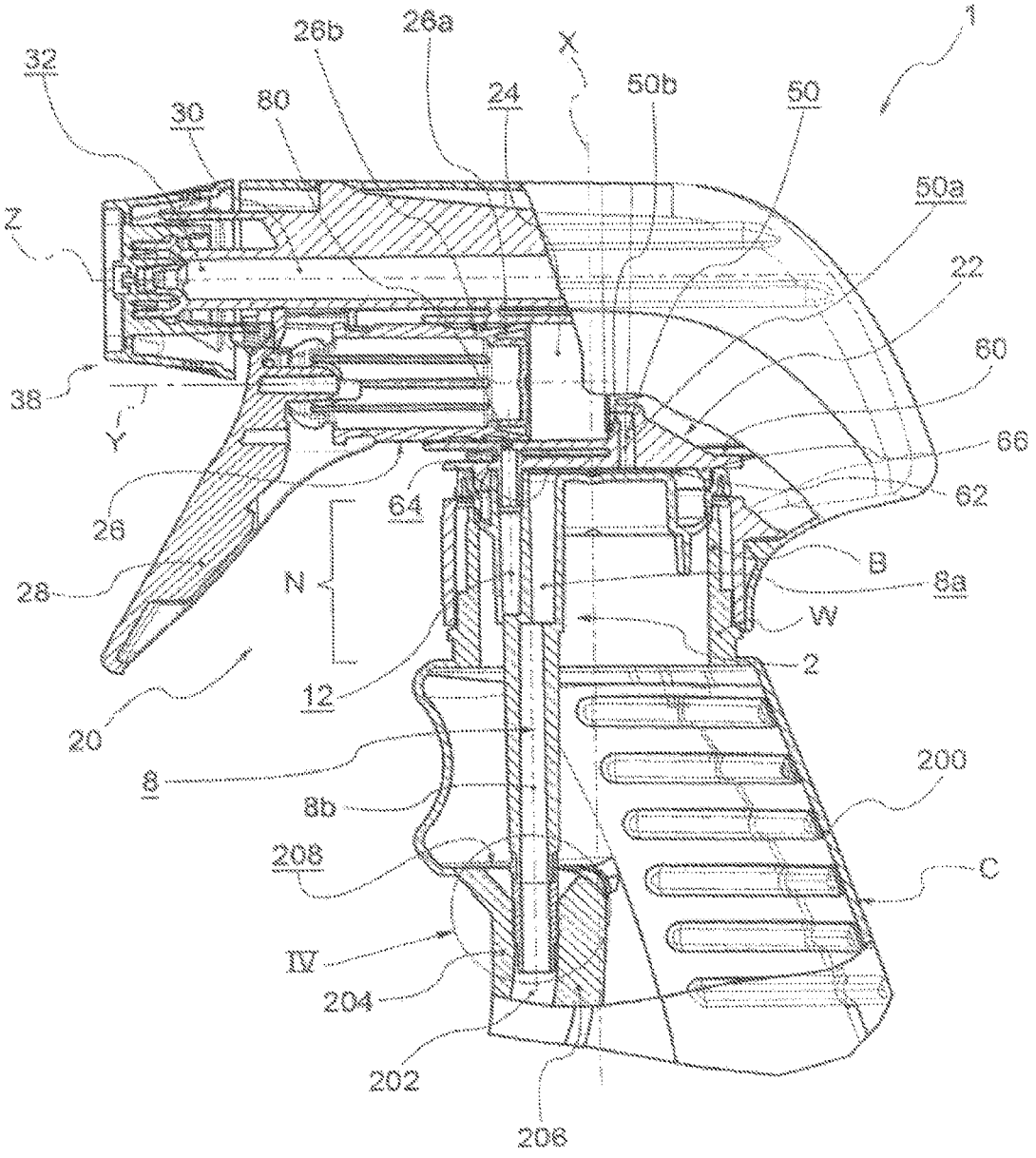


Fig. 2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IV
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202
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Fig.3

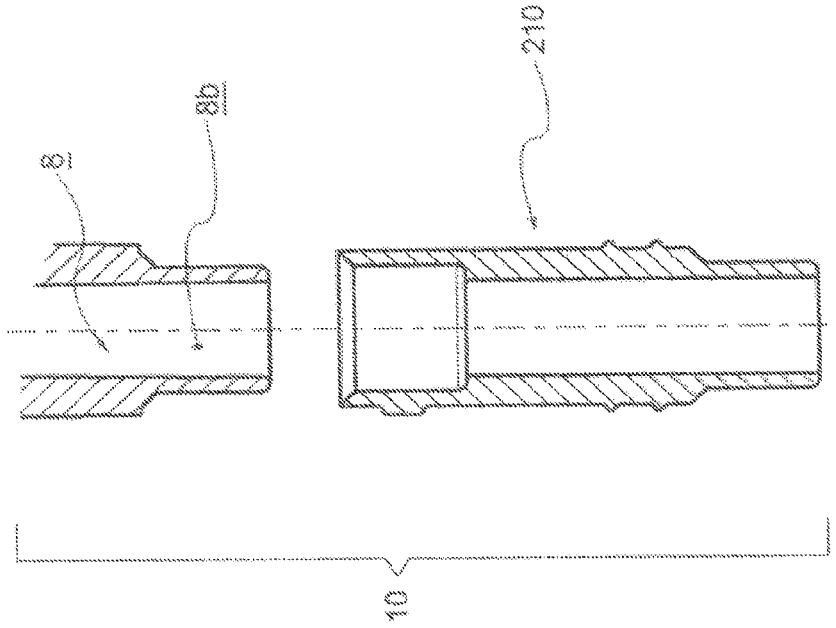

Fig. 3

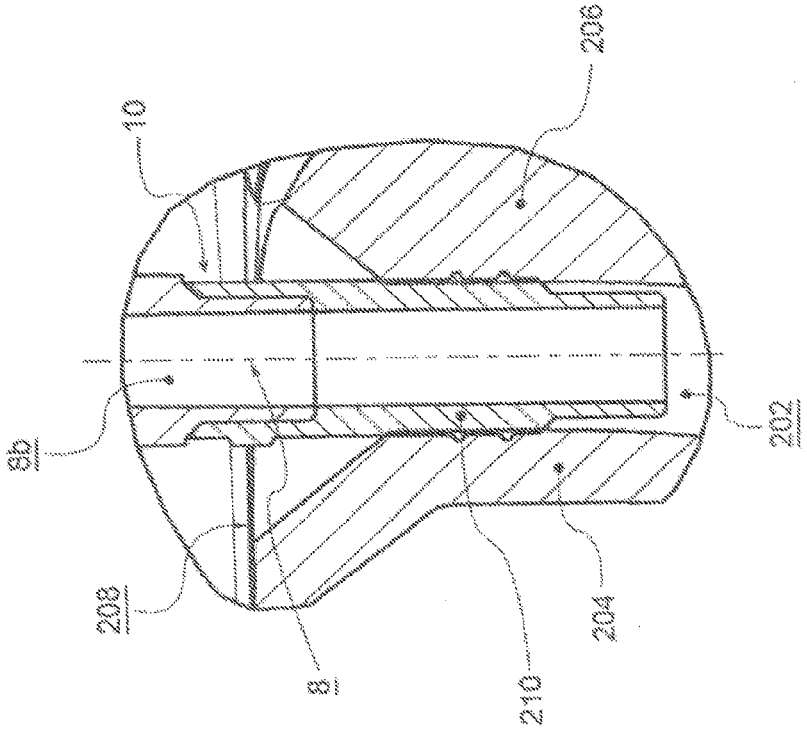

Fig. 4

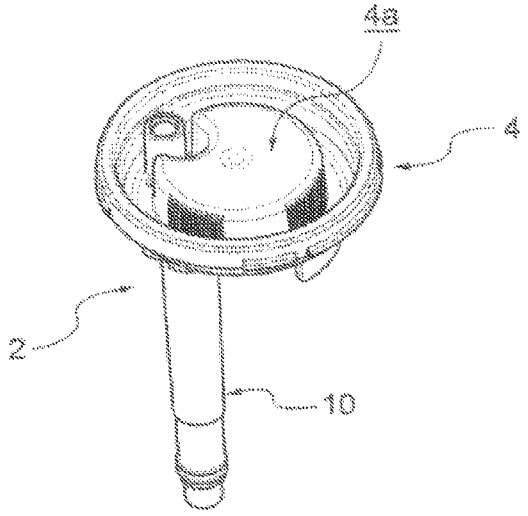

Fig.6

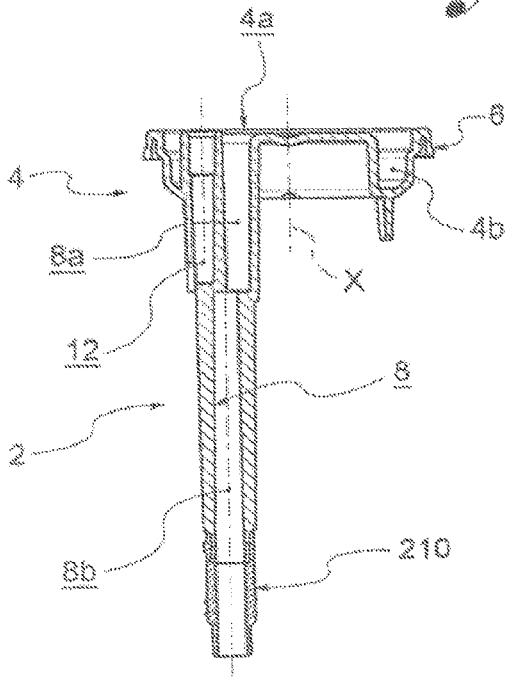

Fig.8

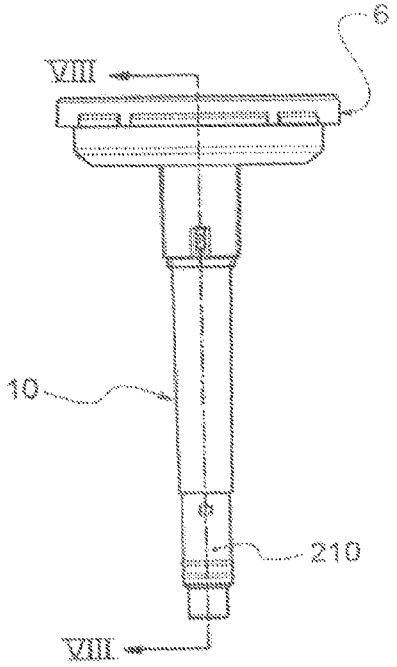

Fig.7

TRIGGER DISPENSER

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of U.S. patent application Ser. No. 14/523,290 filed on Oct. 24, 2014, which is a continuation of U.S. patent application Ser. No. 13/821,685 filed on Mar. 8, 2013, now U.S. Pat. No. 8,870,033 issued on Oct. 28, 2014, which claims benefit of International Patent Application No. PCT/IB2011/051496 filed on Apr. 7, 2011, which claims benefit of Italian Patent Application No. BS2010A000155 filed on Sep. 16, 2010. The entire disclosures of the above applications are incorporated herein by reference.

FIELD

[0002] The present disclosure relates to a manually operated dispenser device of a liquid, generally trigger-operated.

BACKGROUND

[0003] This section provides background information related to the present disclosure which is not necessarily prior art.

[0004] Such dispenser devices, known as in the trade "trigger pumps", are extremely widespread, with an annual production of several hundred million pieces. They are in fact widely used in the household cleaning sector, for treating fabrics and in the world of hobbies etc.

[0005] For the production of such devices to economically worthwhile, the plants need to be able to produce and assemble an extremely large number of pieces. Consequently, even slight improvements to the production process of the components and in the assembly process of the same may entail significant economic benefits.

[0006] In particular, it is essential that the device is easy to assemble even when it has internal components which are asymmetric or off axis.

[0007] All this must necessarily marry with increasingly restrictive requirements regarding functionality of the devices, reliability and the type of jet dispensed.

SUMMARY

[0008] This section provides a general summary of the disclosure, and is not a comprehensive disclosure of its full scope or all of its features.

[0009] The purpose of the present invention is to realise a manually operated dispenser device of a liquid, in particular trigger-operated, which satisfies the aforesaid requirements.

[0010] Further areas of applicability will become apparent from the description provided herein. The description and specific examples in this summary are intended for purposes of illustration only and are not intended to limit the scope of the present disclosure.

DRAWINGS

[0011] The drawings described herein are for illustrative purposes only of selected embodiments and not all possible implementations, and are not intended to limit the scope of the present disclosure.

[0012] FIG. **1** shows a cross-section view of the dispenser device according to the present invention, according to a first embodiment;

[0013] FIG. **2** shows an enlargement of the area II in FIG. **1**;

[0014] FIG. **3** shows a cross-section view of a dispenser device according to the present invention, according to a further embodiment;

[0015] FIG. **4** shows an enlargement of the detail IV in FIG. **3**;

[0016] FIG. **5** shows the detail of FIG. **4**, in separate parts;

[0017] FIG. **6** shows an auxiliary body of the device in FIG. **3**;

[0018] FIG. **7** shows a front view of the auxiliary body in FIG. **6**; and

[0019] FIG. **8** shows a cross-section view of the auxiliary body in FIG. **7**, taken along the section line VIII in FIG. **7**.

[0020] Corresponding reference numerals indicate corresponding parts throughout the several views of the drawings.

DETAILED DESCRIPTION

[0021] Example embodiments will now be described more fully with reference to the accompanying drawings.

[0022] With reference to the appended drawings, reference numeral **1** globally denotes a manually operated dispenser device of a liquid.

[0023] The dispenser device comprises a container C to contain the liquid to be dispensed, comprising a neck N made by an annular wall W around a container axis X, which defines by means of an annular rim B, a container aperture A for access to the inside of the same.

[0024] The dispenser device **1** comprises a dispenser head **20** attached to the container C to manually aspirate the liquid from the container and dispense it to the outside.

[0025] The head **20** is pre-assembled and in general sent for filling of the container separately from it. After filling the container with liquid, the head is coupled to the container.

[0026] The head **20** further comprises an auxiliary body **2** attached to the neck N of the container C, at the aperture A of the same, to close it peripherally forming a seal.

[0027] In particular, the auxiliary body **2** comprises a main portion **4**, inserted through the aperture A in the neck N, provided with a main surface **4***a* which remains external, and an annular collar **6**, overlapping the annular rim B of the neck N, for example folded so as to straddle said annular rim B.

[0028] Preferably, the auxiliary body **2** has, on the outer side, an annular groove **4***b* which surrounds the main surface **4***a*.

[0029] The auxiliary body **2** has a primary liquid aspiration duct **8** extending along the container axis X; coaxial to said container axis X.

[0030] In one embodiment variation, the primary liquid aspiration duct **8** is eccentric to the container axis X, that is radially distanced from it.

[0031] The primary liquid aspiration duct **8** passes through the thickness of the main portion **4**, placing the compartment inside the container in communication with the main surface **4***a*.

[0032] In particular, preferably, the primary liquid aspiration duct **8** is defined through a first tube **10**, coaxial to the container axis X.

[0033] Preferably, a flexible or rigid suction tube is connectable to the tube **10**, which extends as far as the bottom of the container, to suck up the liquid.

[0034] Moreover, the auxiliary body **2** has a primary air aspiration duct **12**, radially distanced from the primary

liquid aspiration duct **8**, passing through the thickness of the main portion **4**, to place the outer environment or main surface **4***a* in communication with the compartment inside the container.

[0035] In particular, preferably, the primary air aspiration duct **12** is defined through a second tube **14**, radially distanced from the first tube **10**.

[0036] Moreover, the head **20** comprises a frame **22** to support the other components and form some passages for the liquid. The auxiliary body **2** is attached to the frame **22**.

[0037] The frame **22** has a pressure chamber **24**, annularly defined by a chamber wall **25**, extending along a pressure axis Y, preferably incident to the container axis X, for example orthogonally.

[0038] The head **20** comprises a piston **26**, sealingly sliding in the pressure chamber **24** along the pressure axis Y, between a rest position, wherein the volume of the pressure chamber **24** is maximum, and a limit dispensing position, wherein the volume of the pressure chamber **24** is minimal, passing through intermediate dispensing positions.

[0039] Preferably, the piston **26** comprises a head seal **26***a* and a tail seal **26***b*, distanced from the head seal along the pressure axis Y, for tightness between the piston and the chamber wall **25** in which it slides.

[0040] The head **20** further comprises manual actuation devices suitable to move the piston **26** manually in the pressure chamber **24**.

[0041] Preferably, the actuation means comprise a trigger **28**, suitable to act on the piston **26**, for example anchored to it, and engaged with the frame **22**, for example hinged so as to rotate with it or sliding in translation on it.

[0042] Preferably, moreover, the head **20** comprises elastic return means able to permanently influence the piston **26** or trigger **28** to return the piston **26** to the rest position.

[0043] The frame **22** further presents a dispenser duct **30** extending along a dispensing axis Z, between a distal extremity **32**, at the aperture towards the outside, and an opposite proximal extremity **34**.

[0044] Preferably, the pressure axis Y is parallel and separate from the dispenser axis Z.

[0045] The head **20** further comprises, preferably, a nozzle **38**, attached to the distal extremity **32** of the dispenser duct **30**, to enable dispensing of the liquid in the desired manner.

[0046] The pressure chamber **24** is suitable for being placed in fluidic communication with the dispenser duct **30**.

[0047] In particular, the head **20** comprises valve dispenser means suitable for allowing the transit of liquid from the pressure chamber **24** to the dispenser duct **30** when, during the dispensing phase, the piston **26** moves from the rest position towards the dispenser limit position, and the liquid exceeds a predefined pressure threshold.

[0048] For example, the valve dispenser means comprise an elastically deformable diaphragm **40**, attached to the frame **22**.

[0049] Moreover, the frame **22** has a secondary liquid aspiration duct **50**, which co-operates in the connection of the pressure chamber **24** with the compartment inside the container.

[0050] Preferably, the secondary liquid aspiration duct **50** comprises an axial section **50***a*, extending parallel to the container axis X, and a radial section **50***b*, extending parallel to the pressure axis Y of the pressure chamber **24**. Following the movement of the liquid aspirated from the container towards the pressure chamber, the axial section **50***a* is upstream of the radial section **50***b*.

[0051] Moreover, the head **20** comprises valve dispenser means suitable for allowing the transit of liquid from the secondary aspiration duct **50** towards the pressure chamber **24** when, during a return phase, the piston **26** moves towards the rest position from the dispenser limit position, and prevents transit of the liquid from the pressure chamber **24** towards the secondary liquid aspiration duct **50** during said dispensing phase.

[0052] Preferably, said valve aspiration means comprise an elastically deformable aspiration diaphragm **52**, fitted between the pressure chamber **24** and the secondary liquid aspiration duct **50**.

[0053] The frame **22** comprises a support plate **60**, by means of which the frame **22** engages with the auxiliary body **2**. The plate **60** has a functional surface **62** on the outside, which the secondary liquid aspiration duct **50** comes out on, in a radially distanced position from the container axis X that is at least partially misaligned from the primary liquid aspiration duct **8**.

[0054] Preferably the secondary liquid aspiration duct **50**, and in particular the axial section **50***a* of the same, is on the opposite side to the secondary air aspiration duct **72** in relation to the container axis X.

[0055] When the head **20** is attached to the container, the functional surface **62** of the frame **22** is axially distanced from the main surface **4***a* of the auxiliary body **2**, so that a joining compartment or duct **64** is formed between these, which connects the main liquid aspiration duct **8** of the auxiliary body **2** with the secondary liquid aspiration duct **50** of the frame **22**.

[0056] The primary liquid aspiration duct **8**, the joining compartment **64** and the secondary liquid aspiration duct **50** thereby form a liquid aspiration passage which places the compartment inside the container in communication with the pressure chamber **24** of the head **20**.

[0057] Moreover, preferably, the frame **22** comprises an annular lip **66**, projecting in the direction of the container axis X from the functional surface **62** of the plate **60**, inserted in the groove **4***b* of the auxiliary body **2**, to form a seal.

[0058] Moreover, the frame **22** comprises a tubular aspiration insert **70**, projecting from the functional surface **62** and inserted so as to form a seal in the aspiration tube **14** of the auxiliary body **2**, defining within it a secondary air aspiration duct **72**. The insert **70** therefore crosses the joining compartment **64** destined for transit of the liquid.

[0059] The primary air aspiration duct **12** and the secondary air aspiration duct **72** are therefore in communication with each other and form a separate air, aspiration passage sealed from the liquid aspiration passage.

[0060] In particular, the secondary air aspiration duct **72** comprises an aspiration hole **80** made through the chamber wall **25**.

[0061] Preferably, when the piston **26** is in the rest position, the hole **80** is separated from the pressure chamber **24** by the head seal **26***a* of the piston **26** and is separated from the outside environment by the tail seal **26***b* of the piston **26**; when the piston **26** is in the dispensing limit position, the hole **80** is in communication with the outside environment, but is separated from the pressure chamber **24** by the tail seal **26***b* (and by the head seal **26***a*).

[0062] In an initial rest configuration, the piston **26** is in the rest position, the valve dispenser means are closed, the valve aspiration means are closed, the air aspiration passage towards the outside is closed; the presence of liquid to dispense in the pressure chamber **24** is presumed.

[0063] In the dispensing phase, the piston **26** completes a dispensing stroke from the rest position to the limit dispensing position by manual activation of the trigger **28**.

[0064] By effect of the liquid in the pressure chamber **24**, the liquid aspiration valve means remain closed, preventing the backflow of liquid towards the container.

[0065] By effect of the pressurised liquid, the valve dispenser means open, making the liquid travel from the pressure chamber **24** to the dispenser duct **30**, thereby enabling dispensing from the nozzle **38**.

[0066] When the trigger is released, the elastic return means move the piston **26** or the trigger **28** from the dispensing limit position towards the rest position.

[0067] In the return phase, the piston **26** performs a return stroke from the dispensing limit position towards the return position.

[0068] The negative pressure which is formed in the pressure chamber **24** closes the dispenser valve means. The negative pressure which is formed in the pressure chamber **24** opens the liquid aspiration valve means and the liquid transits from the compartment inside the container into the pressure chamber **24**, through the primary liquid aspiration duct **8**, the joining compartment **64** and the secondary liquid aspiration duct **50**.

[0069] At least for a part of the return phase, the air aspiration passage is in communication with the outside environment, so that the air can be aspirated into the compartment inside the container.

[0070] The air aspiration passage, and in particular the secondary air aspiration duct **72**, is fluidically separated from the liquid aspiration passage, and in particular from the joining compartment **64**, so that there is no leakage of liquid.

[0071] According to a further embodiment, the container C comprises an annular container wall **200** around the container axis X and an auxiliary liquid aspiration duct **202**, made entirely in said lateral wall of the container C.

[0072] In other words, the container wall **200** comprises a portion of functional wall **204**, for example positioned head-on with the container, that is on the side destined for the liquid to come out, and an auxiliary wall **206**, in one piece with the container wall **200**, inside the container C, which runs along the portion of functional wall **204**, so as to form with it the auxiliary liquid aspiration duct **202**.

[0073] Said duct **202** is open near the bottom of the container, to aspirate the liquid contained in it.

[0074] Preferably, said duct **202** starts from an engagement mouth **208**, axially distanced from the neck N of the container C.

[0075] The primary liquid aspiration duct **8**, at least partially eccentric to the container axis X, is suitable for inserting in the engagement mouth **208** of the auxiliary liquid aspiration duct **202**.

[0076] For example, advantageously, the primary liquid aspiration duct **8** comprises a first section **8***a*, which starts from the main surface **4***a*, having a first duct axis proximal to the container axis X and a second section **8***b*, adjacent to the first section **8***a* and terminating in the engagement mouth **208**, distal to the container axis X.

[0077] Preferably, moreover, the primary liquid aspiration duct **8** comprises, in the terminal part suitable for insertion in the engagement mouth **208**, a flexible coupling portion **210**, made in a less rigid material than the material of the remaining part of the primary liquid aspiration duct **8**.

[0078] Preferably, the flexible coupling portion **210** is made in one piece with the remaining part of the duct **8**, for example by means of a co-moulding process.

[0079] For example, the flexible coupling portion **210** is made in Ethylene-Vinyl-Acetate (EVA) or in a material from the group of thermoplastic elastomers (TPE); the remaining part of the tube is rather made preferably made from high density polyethylene (PEHD).

[0080] Advantageously, this makes insertion of the duct **8** in the engagement mouth **208** particularly easy.

[0081] Preferably, moreover, the primary liquid aspiration duct **8** and the secondary liquid aspiration duct **50** are positioned on diametrically opposite sides the container axis X. In particular, for example, the first section **8***a* of the primary liquid aspiration duct **8** is completely contained on one side of the container axis X and the axial section **50***a* of the secondary liquid aspiration duct **50** is completely contained on the other side.

[0082] Innovatively, the dispenser device according to the present invention, despite having asymmetric components and off-axis ducts, retains considerable assembly simplicity.

[0083] In particular, advantageously, the head ensures a good seal with the container, thanks to the interposition of the auxiliary body between the frame and neck, of the container, made in particularly suitable material for forming a seal with the neck of the container.

[0084] Moreover, advantageously, the head ensures a good internal seal between the frame and auxiliary body, made in materials suitable for such purpose.

[0085] Advantageously, moreover, the dispenser device ensures aspiration of the air in the container preventing the leakage of liquid in said duct.

[0086] According to a further advantageous aspect, the dispenser device ensures aspiration of the air in the container preventing liquid from escaping from the air aspiration passage, for example when the device is inclined.

[0087] In particular, according to a further advantageous aspect, the connection system of the head and container is particularly suitable in the case of containers with liquid aspiration ducts built-in to the container, for which the built-in duct is strongly off-axis with the aspiration duct of the frame and therefore needs an intermediate fluidic connection structure.

[0088] It is clear that a person skilled in the art may make modifications to the dispenser device described above so as to satisfy contingent requirements, all contained within the sphere of protection as defined by the appended claims.

[0089] The foregoing description of the embodiments has been provided for purposes of illustration and description. It is not intended to be exhaustive or to limit the disclosure. Individual elements or features of a particular embodiment are generally not limited to that particular embodiment, but, where applicable, are interchangeable and can be used in a selected embodiment, even if not specifically shown or described. The same may also be varied in many ways. Such variations are not to be regarded as a departure from the disclosure, and all such modifications are intended to be included within the scope of the disclosure.

What is claimed is:

1. A pump system, comprising:

a trigger sprayer comprising a valve body, the valve body comprising:

a circumferential connection projection extending downward off the valve body;

at least one seal ring projecting from the circumferential connection projection; and

at least one connector;

a dip tube connector comprising:

at least one connector lip snapped over the at least one connector and attaching the dip tube connector to the valve body;

at least one plug seal ring sealed against the at least one seal ring; and

a fluid chamber formed between the dip tube connector and valve body.

2. The pump system of claim **1**, further comprising:

a connector head in the dip tube connector, wherein the at least one connector lip is positioned on a periphery of the connector head; and

a port extending off of the connector head, comprising a port outlet in the connector head and a port inlet in an end of the port opposite the connector head.

3. The pump system of claim **2**, wherein the port inlet is in communication with the fluid chamber.

4. A pump system, comprising:

a trigger sprayer comprising a valve body, the valve body comprising:

a circumferential connection projection extending downward off the valve body;

at least one seal ring projecting from the circumferential connection projection; and

at least one connector;

a dip tube connector attached to the valve body, the dip tube connector comprising:

a connector head;

a port extending off of the connector head, the port comprising an outlet in the connector head and an inlet opposite the outlet;

at least one connector lip connected to the at least one connector;

at least one plug seal ring sealed against the at least one seal ring;

a fluid chamber formed between the dip tube connector and valve body, wherein the outlet of the port is in communication with the fluid chamber.

5. The pump system of claim **4**, further comprising a container and a dip tube in the container, wherein the container is connected to the valve body and the inlet of the port of the dip tube connector seals with the dip tube.

6. The pump system of claim **4**, further comprising a container and a dip tube in the container, wherein the container is connected to the valve body and a portion of the port of the dip tube connector is sealed against a portion of the dip tube adjacent the inlet of the port.

7. The pump system of claim **6**, wherein the port further comprises at least one seal sealed against the dip tube.

8. A dispenser system, comprising:

a container;

a container aperture in the top of the container;

a functional wall in the container;

an auxiliary liquid aspiration opening in the functional wall;

a dispenser head attached to the container relative to the container aperture, the dispenser head including a frame;

at least one connector in the frame;

an auxiliary body, comprising a collar attached with the at least one connector and retaining the auxiliary body with the frame; and

a duct formed between the frame and the auxiliary body.

9. The dispenser system of claim **8**, wherein the auxiliary body further comprises:

an auxiliary body head, wherein the collar is positioned about a periphery of the auxiliary body head; and

a liquid aspiration duct extending off of the auxiliary body head, comprising a duct outlet in the auxiliary body head and a duct inlet in an end of the liquid aspiration duct opposite the auxiliary body head and seated in the auxiliary liquid aspiration opening.

10. The dispenser system of claim **9**, wherein at least a portion of the liquid aspiration duct adjacent the duct inlet is sealed against at least a portion of the functional wall.

11. The dispenser system of claim **8**, further comprising:

an annular lip extending downward of the frame towards the container;

the annular lip providing a seal at a lower outer edge projecting from the annular lip; and

an annular groove in the auxiliary body, wherein the annular groove seals against the seal at the lower outer edge of the annular lip.

12. A dispenser device for dispensing a liquid from a container, comprising:

a dispenser head including a frame, the frame comprising:

an annular lip extending downward of the frame;

the annular lip providing a seal at a lower outer edge thereof; and

a connector;

an auxiliary body comprising:

a collar attached to the connector and attaching the auxiliary body to the frame; and

an annular groove sealed against the seal at the lower outer edge of the annular lip; and

a duct formed between the auxiliary body and the frame.

13. The dispenser device of claim **12**, further comprising:

an auxiliary body head in the auxiliary body, wherein the collar is positioned on a periphery of the auxiliary body head; and

a liquid aspiration duct extending off of the auxiliary body head, comprising a duct outlet in the auxiliary body head and a duct inlet in an end of the liquid aspiration duct opposite the auxiliary body head.

14. The dispenser device of claim **13**, wherein the duct inlet is in communication with the duct formed between the auxiliary body and the frame.

15. A dispenser device for dispensing a liquid from a container, comprising:

a dispenser head including a frame, the frame comprising:

an annular lip extending downward of the frame;

the annular lip providing a seal at a lower outer edge thereof; and

a connector;

an auxiliary body attached to the frame, the auxiliary body comprising:

an auxiliary body head;

a liquid aspiration duct extending off of the auxiliary body head, the liquid aspiration duct comprising an outlet in the auxiliary body head and an inlet opposite the outlet;

a collar attached to the connector;

an annular groove sealed against the seal at the lower outer edge of the annular lip; and

a duct formed between the auxiliary body and the frame, wherein the outlet of the liquid aspiration duct is in communication with the duct formed between the auxiliary body and the frame.

16. The dispenser device of claim **15**, further comprising a container and a functional wall in the container, wherein the container is connected to the frame and the inlet of the liquid aspiration duct of the auxiliary body seals with the functional wall.

17. The dispenser device of claim **15**, further comprising a container and a functional wall in the container, wherein the container is connected to the frame and a portion of the liquid aspiration duct of the auxiliary body is sealed against a portion of the functional wall adjacent the inlet of the liquid aspiration duct.

18. The dispenser device of claim **17**, wherein the liquid aspiration duct further comprises at least one seal sealed against the functional wall.

* * * * *