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(54) **Dispenser pump**

(57) It is provided a dispenser pump for pumping a fluid from a reservoir to a dispenser head comprising a dip tube (12) for being inserted into the fluid located inside the reservoir, a cylinder housing (14) connected with the dip tube (12), a piston pipe (18) guided in longitudinal direction by the cylinder housing (14) for pumping the fluid from the dip tube (12) via the cylinder housing (14) to the dispenser head, wherein the piston pipe (18) comprises a connecting area (20) for connecting the dispenser head to the piston pipe (18), a top plate (24) connected with the piston pipe (18), wherein the top plate (18) is located between the connecting area (20) of the piston pipe (18) and the cylinder housing (14), a bottom plate (26) connected with the cylinder housing (14) and a mainly cylindrical spring bellow (28) connected with the top plate (24) and the bottom plate (26) for pushing the piston pipe (18) in a direction outwards the cylinder housing (14). Due to the connection of the spring bellow (28) with the top plate (24) and the bottom plate (26) a simplified and cost efficient design particularly with respect to the spring bellow (28) is provided leading to a cost efficient manufacturing of a dispenser which may particularly used for applying hair care products.

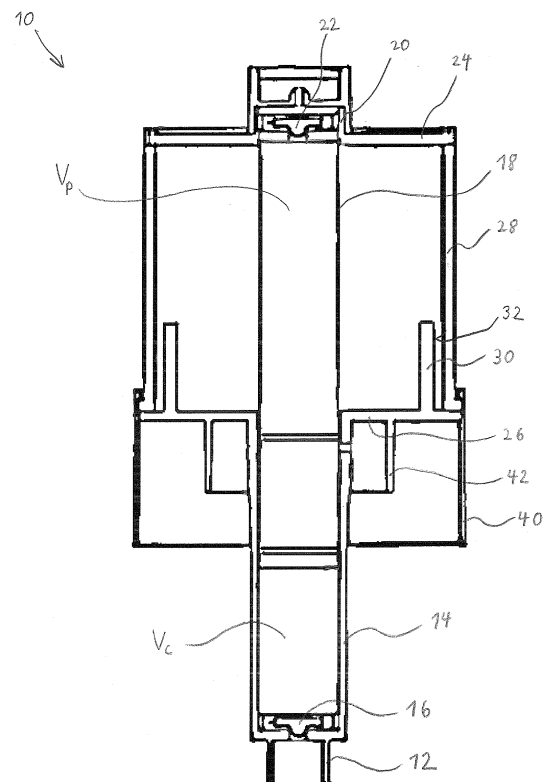


Fig. 1

Description

[0001] The invention relates to a dispenser pump, by means of which a fluid can be pumped from a reservoir upwards to a dispenser head, particularly for applying hair care products.

[0002] From WO 96/28257 a dispenser with a dispenser pump is known comprising a dip tube and a piston pipe for pumping a liquid into a channel of a housing and from there through the piston to a chamber of a dispenser head via a valve. From the chamber of the dispenser head the liquid can be dispensed via a further valve of the dispenser head. The dispenser head can be pushed down for pumping the liquid against the spring force of a harmonica bellow which can push the dispenser head back in its starting position. The harmonica bellow is connected with the dispenser head and an intermediate part by which the housing can be clamped between a bottle and the intermediate part screwed with the bottle.

[0003] There is a permanent need for reducing the manufacturing costs of a dispenser used for applying hair care products.

[0004] It is an object of the invention providing measures enabling a cost efficient manufacturing of a dispenser which may particularly used for applying hair care products.

[0005] The solution of this object is provided according to the invention by a dispenser pump according to the features of claim 1. Preferred embodiments of the invention are given by the dependent claims, which can constitute each solely or in combination an aspect of the invention.

[0006] An aspect of the invention is directed to a dispenser pump for pumping a fluid from a reservoir to a dispenser head comprising a dip tube for being inserted into the fluid located inside the reservoir, a cylinder housing connected with the dip tube, a piston pipe guided in longitudinal direction by the cylinder housing for pumping the fluid from the dip tube via the cylinder housing to the dispenser head, wherein the piston pipe comprises a connecting area for connecting the dispenser head to the piston pipe, a top plate connected with the piston pipe, wherein the top plate is located between the connecting area of the piston pipe and the cylinder housing, a bottom plate connected with the cylinder housing and a mainly cylindrical spring bellow connected with the top plate and the bottom plate for pushing the piston pipe in a direction outwards the cylinder housing.

[0007] Due to the top plate connected with the piston pipe and the bottom plate connected with cylinder housing the cylindrical spring bellow may be arranged on a significant larger diameter than the piston pipe and the cylinder housing. Particularly the spring bellow does not need having a conical shape for fitting one part of the spring bellow into a dispenser head. This particularly facilitates providing a simplified design for the spring bellow for providing a suitable spring characteristic. Particularly the spring bellow is not designed like a harmonica but

can be designed as mathematical hollow cylinder in a ring-like manner. The spring bellow can be cost efficient manufactured using simply designed tools, particularly molding forms, wherein the spring characteristic of the spring bellow may be adjusted at a given material by the wall thickness and/or the outer diameter of the cylindrical spring bellow. The extension of the top plate and the bottom plate in a radial direction orthogonal to the longitudinal direction can be easily adjusted to the design needs of the spring bellow without affecting other parts of the dispenser pump. Further the spring bellow can be located significantly spaced in radial direction to the piston pipe and the cylinder housing so that it can be safeguarded that the spring bellow does not come into contact with the pumped fluid. Thus, it is not necessary choosing a material for the spring bellow which can not be impaired, for instance by corrosion, by the pumped fluid. The pump functionality of the dispenser pump can be realized without the dispenser head. The dispenser pump is designed as an open system which can be applied for different dispenser heads. Thus, the dispenser pump can be easily used for different dispensers with different dispenser heads so that different dispensers may comprise the same design of the dispenser pump. Due to the enabled mass production of the dispenser pump the manufacturing cost for the dispensers may be reduced. Further it is possible designing the top plate as an actuator means, by which a user may apply a force for pressing the piston pipe into the cylinder housing. In addition or in the alternate a dispenser head connected with the piston pipe via the connecting area of the piston pipe may be used as the actuator means. The dispenser pump provides different possibilities of actuating the dispenser pump so that a high flexibility for using the dispenser pump in different types of dispensers is given. Due to the connection of the spring bellow with the top plate and the bottom plate a simplified and cost efficient design particularly with respect to the spring bellow is provided leading to a cost efficient manufacturing of a dispenser which may particularly used for applying hair care products.

[0008] The dip tube may be made from a rigid or flexible material and is particularly designed reaching to a very low position inside the reservoir, particularly a deepening at the bottom of a bottle defining the reservoir. The dispenser pump may be connected with the bottle, wherein the reservoir of the bottle may be filled with the fluid particularly up to the level of the bottom plate. The bottom plate may close an opening of the bottle. The piston pipe and the cylinder housing may constitute a pump. When the piston pipe is pushed into the cylinder housing an increasing pressure may be provided, wherein when the piston pipe is pulled away from the cylinder housing a decreasing pressure, particularly a negative pressure, is provided. Due to the negative pressure fluid may be sucked into the cylinder housing from the reservoir and delivered to the dispenser head at increasing positive pressure. Particularly the fluid is pumped via the piston pipe. The cylinder housing and/or the piston pipe may

comprise a suitable valve, particularly one-way valve, for safeguarding the intended pump direction. The connecting area of the piston pipe can be utilized for connecting the dispenser head or a different device with the piston pipe in a manner that this part is in fluid communication with the dip tube. The top plate and/or the bottom plate is particularly arranged orthogonal to the longitudinal direction. The spring bellow is particularly compressed when the piston pipe is pushed into the cylinder housing. In this inserted position of the piston pipe in the cylinder housing the top plate may be nearer to the bottom plate than in a lesser inserted position of the piston pipe in the cylinder housing. The spring bellow may provide a spring force pressing the piston pipe out the cylinder head until a minimum inserted position of the piston pipe in the cylinder housing is reached. The corresponding spring force may be provided by compressing the spring bellow, particularly by elastically deforming an elastic material of the spring bellow.

[0009] Particularly a protruding stop, particularly protruding from the bottom plate towards the top plate, arranged radially spaced to the cylinder housing is provided, wherein the top plate or the bottom plate rests on the stop in a maximum inserted position of the piston pipe in the cylinder housing. The stop may define the maximum inserted position of the piston pipe in the cylinder housing so that the maximum pressure inside the cylinder housing can be limited to a predefined amount. Preferably a plurality of stops and/or a mainly ring-shaped stop is provided. Due to the mainly planar contact of the top plate or the bottom plate onto the stop an inclination of the top plate relative to the cylinder housing and/or an inclination of the bottom plate relative to the piston pipe may be prevented. This facilitates aligning the piston pipe mainly coaxial with respect to the cylinder housing in the maximum inserted position so that the pressure inside the cylinder housing and the spring force provided by the spring bellow is sufficient pressing the piston pipe in a direction outwards the cylinder housing. A blocking or jamming of the piston pipe inside the cylinder housing may be prevented. Particularly preferred the stop comprises an outer face pointing radially outwards, wherein the outer face blocks the spring bellow against bending radially inwards. The outer face of the stop may be arranged close to the spring bellow. If the spring bellow tends to bend radially inwards, when the piston pipe is pushed into the cylinder housing, the spring bellow would meet the outer face of the stop so that a bending of the spring bellow radially inwards is blocked by the stop. Instead of bending radially inwards the spring bellow bends radially outwards where the spring bellow is not blocked. Thus, it is prevented that the spring bellow is clamped by the stop when the piston pipe is pushed into the cylinder housing.

[0010] Preferably at least one protruding guiding web, particularly protruding from the top plate towards the bottom plate, is provided, wherein the guiding web is guided in longitudinal direction by a corresponding guiding open-

ing of the stop. Due to the guided guiding web an inclination of the top plate to the bottom plate may be prevented. Particularly the guiding may take place significantly spaced in radial direction to the piston pipe guided inside the cylinder housing so that a mainly coaxial movement of the piston pipe to the cylinder housing between the minimum inserted position and the maximum inserted position with a high accuracy may be provided without the need for small manufacturing tolerances.

[0011] Particularly preferred the guiding web is loss-proof connected with the stop, particularly by means of a clip-connection. The guiding web particularly comprises a clip nose providing an undercut face for abutting the stop in a minimum inserted position of the piston pipe in the cylinder housing. The clip-connection allows a movement from the minimum inserted position to the maximum inserted position of the piston pipe. Due to the loss-proof connection the minimum inserted position of the piston pipe may be defined. Particularly the undercut face about the stop in the minimum inserted position and blocks a further movement of the piston pipe out the cylinder housing.

[0012] Particularly an air volume is sealed between the top plate, the bottom plate and the spring bellow. The spring bellow may particularly act like a gas damper. By compressing a compressible gas inside the spring bellow an increased spring force may be provided. The air volume may be air-tight sealed. In the alternate a significant leakage of the gas inside the air volume, particularly via guiding openings in the stop for guiding guiding webs, may be provided. In this case the sealed, but not air-tight sealed, air volume may prevent a too fast actuating of the dispenser pump without significantly increasing a necessary actuating force for reaching the maximum inserted position of the piston pipe in the cylinder housing.

[0013] Preferably the spring bellow is made from an elastomeric material, particularly TPE. Such kind of material may provide a sufficient elasticity for providing a suitable spring characteristic for the spring bellow.

[0014] Particularly preferred the spring bellow is connected with the top plate and/or the bottom plate by 2-component injection or insertion molding. The top plate and/or the bottom plate may be made from a plastic material so that the spring bellow may be connected with the top plate and/or the bottom plate during the molding process for manufacturing the top plate and/or the bottom plate. The number of manufacturing steps may be reduced leading to reduced manufacturing costs.

[0015] Particularly the spring bellow comprises a mainly cylindrical shape in the minimum inserted position of the piston pipe in the cylinder housing and is bend outwards in the maximum inserted position of the piston pipe in the cylinder housing. The spring bellow may be compressed in the maximum inserted position of the piston pipe and relaxed in the minimum inserted position of the piston pipe. Due to the hollow cylindrical and/or ring-shaped design of the spring bellow the material of the spring bellow may bend radially outwards when the

spring bellow is compressed. The bended material of the spring bellow does not hit a part inside the spring bellow so that a mainly step-less spring characteristic for the spring bellow is given. The spring characteristic of the spring bellow may be particularly mainly linear.

[0016] Preferably the dip tube is connected to a housing volume of the cylinder housing via an inlet valve, particularly a one-way valve, wherein the piston pipe comprises an inner piston volume communicating with the housing volume via a connecting valve, particularly a one-way valve. When a negative pressure applies inside the housing volume of the cylinder housing fluid may be sucked in from the reservoir or the dip tube into the housing volume via the inlet valve, wherein the connecting valve is closed. When the piston pipe is pushed into the cylinder housing the inlet valve closes so that the fluid inside the housing volume can be pressed through the connecting valve towards the dispenser head via the piston volume of the piston pipe. Particularly the piston volume is filled with the pumped fluid, wherein after a further stroke of the dispenser pump the further pumped fluid displaces the prior pumped fluid inside the piston volume towards the dispenser head, where the fluid can be dispensed and applied.

[0017] Particularly preferred the housing volume comprises a diameter d_C orthogonal to the longitudinal direction, wherein the piston volume comprises a diameter d_P orthogonal to the longitudinal direction, wherein $0.80 \leq d_P/d_C < 1.00$, particularly $0.85 \leq d_P/d_C \leq 0.99$, preferably $0.90 \leq d_P/d_C \leq 0.98$ and most preferred $0.95 \leq d_P/d_C \leq 0.97$ applies. Particularly the diameter d_P of the piston volume is only smaller with respect to the diameter d_C of the housing volume due to the necessary wall thickness of the piston pipe. The piston pipe may be made from a quite less amount of material reducing the material costs and the manufacturing costs.

[0018] Particularly the housing volume comprises a volume V_C , wherein the piston volume comprises a volume V_P , wherein $0.70 \leq V_P/V_C < 1.30$, particularly $0.80 \leq V_P/V_C < 1.20$, preferably $0.90 \leq V_P/V_C < 1.10$ and most preferred $V_P/V_C = 1.00 \pm 0.05$ applies. The housing volume V_C is measured in the minimum inserted position of the piston pipe and is axially bordered by the piston pipe and a front face opposite to the piston pipe. The piston volume V_P is axially bordered by a front face pointing to the cylinder housing and an opposing front face and/or the level of the top plate. When the housing volume corresponds mainly to the piston volume the piston volume can be mainly completely filled with the fluid filling the housing volume so that after a further pushing of the piston pipe in the cylinder housing immediately fluid can be dispensed via the dispenser head. The housing volume and the piston volume may differ slightly for instance for compensating a further volume inside the dispenser head and/or for providing an intended residual volume inside the piston volume compared to the housing volume. Due to the residual volume the piston pipe has to be pushed via a minimum distance against the spring force of the

spring bellow before the liquid inside the piston volume is dispensed so that the risk of an unintended dispensing of the liquid is reduced.

[0019] Preferably the piston pipe comprises an outlet valve, particularly a one-way valve, for feeding the dispenser head, wherein particularly the top plate is located between the outlet valve of the piston pipe and the cylinder housing. The outlet valve may define an upper end of the piston volume inside the piston pipe. Due to the outlet valve a necessary minimum pressure inside the piston pipe may be defined so that the risk of an unintended dispensing of the liquid is reduced. The outlet valve is particularly positioned radially inside the connecting area.

[0020] Particularly preferred a dispenser head or a mixing bowl is releasably connected with the connecting area of the piston pipe. Due to the releasable connection an exchange of the dispenser head or the mixing bowl is facilitated. For instance the connecting area comprises a thread for screwing and unscrewing the dispenser head or the mixing bowl.

[0021] Particularly a connecting collar for connecting the dispenser pump with a bottle is provided, wherein the connecting collar protrudes from the bottom plate radially spaced to the cylinder housing. For instance the connecting collar comprises a thread for screwing the dispenser pump to the bottle. Particularly the connecting collar comprises an inner thread to be screwed to an outer thread of a bottleneck of the bottle. The bottle particularly comprises the reservoir filled with the liquid to be dispensed via the dispenser pump. A secure connection of the dispenser pump with the bottle may be provided.

[0022] Particularly preferred a guiding collar protruding from the bottom plate is provided. The guiding collar may abut a part of the bottle, particularly an upper part of the bottle so that the dispenser head may be connected with the bottle in a predefined relative position in vertical direction. Due to the abutting guiding collar the dip tube may be positioned a defined place inside the bottle, particularly in a groove provided at a bottom of the bottle. The guiding collar may protrude from the bottom plate and/or may be positioned radially spaced to the cylinder housing.

[0023] Preferably the cylinder housing, the bottom plate and particularly the stop and/or the connecting collar are one-piece and/or the piston pipe, the top plate and the connecting area are one-piece. Particularly the dispenser pump may consist of three assembling units, wherein besides sealings and valves only three separate parts of the piston pump may be present. The low number of different parts facilitates the mounting of the dispenser pump und leads to reduced manufacturing costs.

[0024] These and other aspects of the invention will be apparent from and elucidated with reference to the embodiments described hereinafter, wherein the described features can constitute each solely or in combination an independent aspect of the invention. In the drawings:

Fig. 1: shows a sectional side view of a dispenser pump in a minimum inserted position and

Fig. 2: shows a sectional side view of the dispenser pump in Fig. 1 in a maximum inserted position.

[0025] The dispenser pump 10 illustrated in Fig. 1 and Fig. 2 comprises a dip tube 12 which may reach into a reservoir of a bottle filled with a fluid to be dispensed. The dip tube 12 communicates with a housing volume V_C of a cylinder housing 14 via an inlet valve 16 which is designed as a one-way-valve. The cylinder housing 14 guides a piston pipe 18 in longitudinal direction. The piston pipe 18 comprises a piston volume V_P communicating with the housing volume V_C via a not illustrated connecting valve which is designed as a one-way-valve. The piston pipe 18 comprises a connecting area 20 by which a dispenser head or another part may be releasably connected to the piston pipe. An outlet valve 22 is positioned radially inside the connecting area 20, wherein the outlet valve 22 is designed as a one-way-valve for defining a minimum pressure inside the piston volume V_P for the dispensed fluid. A fluid sucked in via the inlet valve 16 into the housing volume V_C may be pressed into the a piston volume V_P and displaced upwards by a further pumped amount of fluid via the outlet valve 22 to the dispenser head.

[0026] The piston pipe 18 is one-piece with a top plate 24, wherein the cylinder housing 14 is one-piece with a bottom plate 26. A spring bellow 28 is fixed with the top plate 24 and the bottom plate 26 particularly by 2-component injection molding ("2K-molding"), bonding or clamping. The spring bellow 28 is made from a thermoplastic Elastomer ("TPE") and designed as a ring-shaped hollow cylinder in the minimum inserted position of the piston pipe 18 in the cylinder housing 14 (Fig. 1), wherein the material of the spring bellow 28 may bend radially outwards in the maximum inserted position of the piston pipe 18 in the cylinder housing 14 (Fig. 2). When the piston pipe 18 is pushed into the cylinder housing 14 the spring bellow 28 may provide an increasing spring force for pushing the piston pipe 18 back into the minimum inserted position.

[0027] In the illustrated embodiment the bottom plate 26 comprises a ring-shaped stop 30 defining the maximum inserted position of the piston pipe 18 when the top plate 24 rests on the stop 30 (Fig. 2). The stop 30 is connected to the bottom plate 26 and particularly one-piece with the bottom plate 26. In the alternate the stop 30 may be connected with the top plate 24, wherein the bottom plate 26 rests on the stop 30 in the maximum inserted position of the piston pipe 18. The stop comprises an outer face 32 arranged close to the spring bellow 28. When the spring bellow 28 tends to bend radially inwards the spring bellow 28 would meet the outer face 32 of the stop so that a bending of the spring bellow radially inwards is blocked by the stop 30. Instead of bending radially inwards the spring bellow 28 bends radially

outwards where the spring bellow 28 is not blocked.

[0028] Further a connecting collar 40 is provided which protrudes vertically upwards from the bottom plate 26. The dispenser pump 10 may be connected to a bottle via the connecting collar 42 for instance by a screw connection. If so, a guiding collar 40 protruding from the bottom plate 26 downwards may be provided. The guiding collar 40 may abut a part of the bottle for defining a relative position of the cylinder housing 14 and the dip tube 12 inside the bottle.

Claims

1. Dispenser pump for pumping a fluid from a reservoir to a dispenser head comprising
 - a dip tube (12) for being inserted into the fluid located inside the reservoir,
 - a cylinder housing (14) connected with the dip tube (12),
 - a piston pipe (18) guided in longitudinal direction by the cylinder housing (14) for pumping the fluid from the dip tube (12) via the cylinder housing (14) to the dispenser head, wherein the piston pipe (18) comprises a connecting area (20) for connecting the dispenser head to the piston pipe (18),
 - a top plate (24) connected with the piston pipe (18), wherein the top plate (18) is located between the connecting area (20) of the piston pipe (18) and the cylinder housing (14),
 - a bottom plate (26) connected with the cylinder housing (14) and
 - a mainly cylindrical spring bellow (28) connected with the top plate (24) and the bottom plate (26) for pushing the piston pipe (18) in a direction outwards the cylinder housing (14).
2. Dispenser pump according to claim 1 wherein a protruding stop (30), particularly protruding from the bottom plate (26) towards the top plate (24), arranged radially spaced to the cylinder housing (14) is provided, wherein the top plate (24) or the bottom plate (26) rests on the stop (30) in a maximum inserted position of the piston pipe (18) in the cylinder housing (14).
3. Dispenser pump according to claim 2 wherein the stop (30) comprises an outer face (32) pointing radially outwards, wherein the outer face (32) blocks the spring bellow (28) against bending radially inwards.
4. Dispenser pump according to claim 2 or 3 wherein at least one protruding guiding web, particularly protruding from the top plate (24) towards the bottom plate (26), is provided, wherein the guiding web is guided in longitudinal direction by a corresponding guiding opening of the stop (30), wherein the guiding

web is loss-proof connected with the stop, particularly by means of a clip-connection

releasably connected with the connecting area (20) of the piston pipe (18).

5. Dispenser pump according to anyone of claims 1 to 4 wherein an air volume is sealed between the top plate (24), the bottom plate (26) and the spring bellow (28). 5
6. Dispenser pump according to anyone of claims 1 to 5 wherein the spring bellow (28) is made from an elastomeric material, particularly TPE. 10
7. Dispenser pump according to anyone of claims 1 to 6 wherein the spring bellow (28) is connected with the top plate (24) and/or the bottom plate (26) by 2-component injection or insertion molding. 15
8. Dispenser pump according to anyone of claims 1 to 7 wherein the spring bellow (28) comprises a mainly cylindrical shape in the minimum inserted position of the piston pipe (18) in the cylinder housing (14) and is bend outwards in the maximum inserted position of the piston pipe (18) in the cylinder housing (14). 20
9. Dispenser pump according to anyone of claims 1 to 8 wherein the dip tube (12) is connected to a housing volume (V_C) of the cylinder housing (14) via an inlet valve (16), particularly a one-way valve, wherein the piston pipe (18) comprises an inner piston volume (V_P) communicating with the housing volume (V_C) via a connecting valve, particularly a one-way valve. 25
10. Dispenser pump according to claim 9 wherein the housing volume (V_C) comprises a diameter d_C orthogonal to the longitudinal direction, wherein the piston volume (V_P) comprises a diameter d_P orthogonal to the longitudinal direction, wherein $0.80 \leq d_P/d_C < 1.00$, particularly $0.85 \leq d_P/d_C \leq 0.99$, preferably $0.90 \leq d_P/d_C \leq 0.98$ and most preferred $0.95 \leq d_P/d_C \leq 0.97$ applies. 30
11. Dispenser pump according to claim 9 or 10 wherein the housing volume comprises a volume V_C , wherein the piston volume comprises a volume V_P , wherein $0.70 \leq V_P/V_C < 1.30$, particularly $0.80 \leq V_P/V_C < 1.20$, preferably $0.90 \leq V_P/V_C < 1.10$ and most preferred $V_P/V_C = 1.00 \pm 0.05$ applies. 35
12. Dispenser pump according to anyone of claims 1 to 11 wherein the piston pipe (18) comprises an outlet valve (22), particularly a one-way valve, for feeding the dispenser head, wherein particularly the top plate (24) is located between the outlet valve (22) of the piston pipe (18) and the cylinder housing (14). 40
13. Dispenser pump according to anyone of claims 1 to 12 wherein a dispenser head or a mixing bowl is 45
14. Dispenser pump according to anyone of claims 1 to 13 wherein a connecting collar (42) for connecting the dispenser pump (10) with a bottle is provided, wherein the connecting collar (42) protrudes from the bottom plate (26) radially spaced to the cylinder housing (14). 50
15. Dispenser pump according to anyone of claims 1 to 14 wherein the cylinder housing (14), the bottom plate (26) and particularly the stop (30) and/or the connecting collar (40) are one-piece and/or the piston pipe (18), the top plate (24) and the connecting area (20) are one-piece. 55

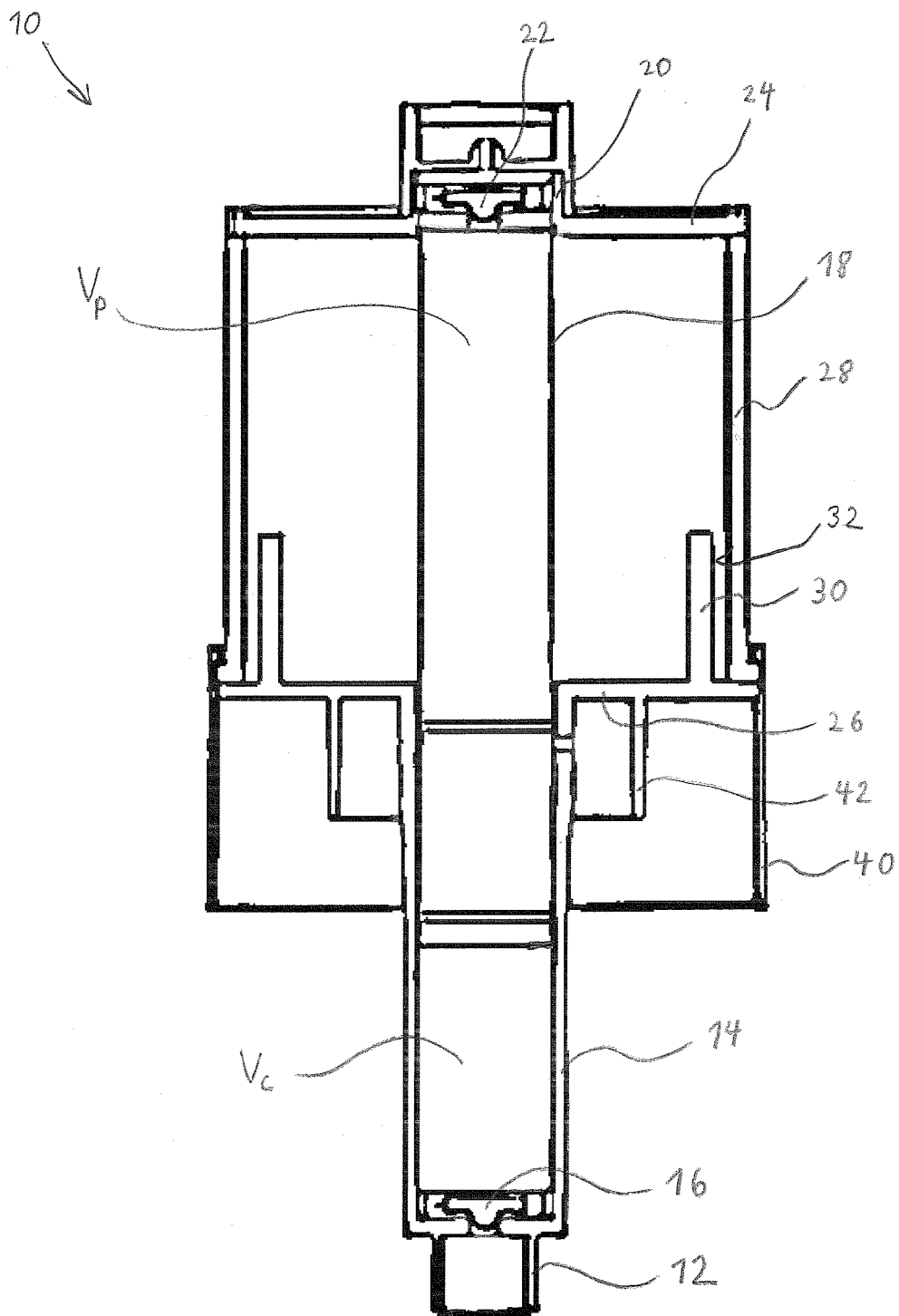


Fig. 1

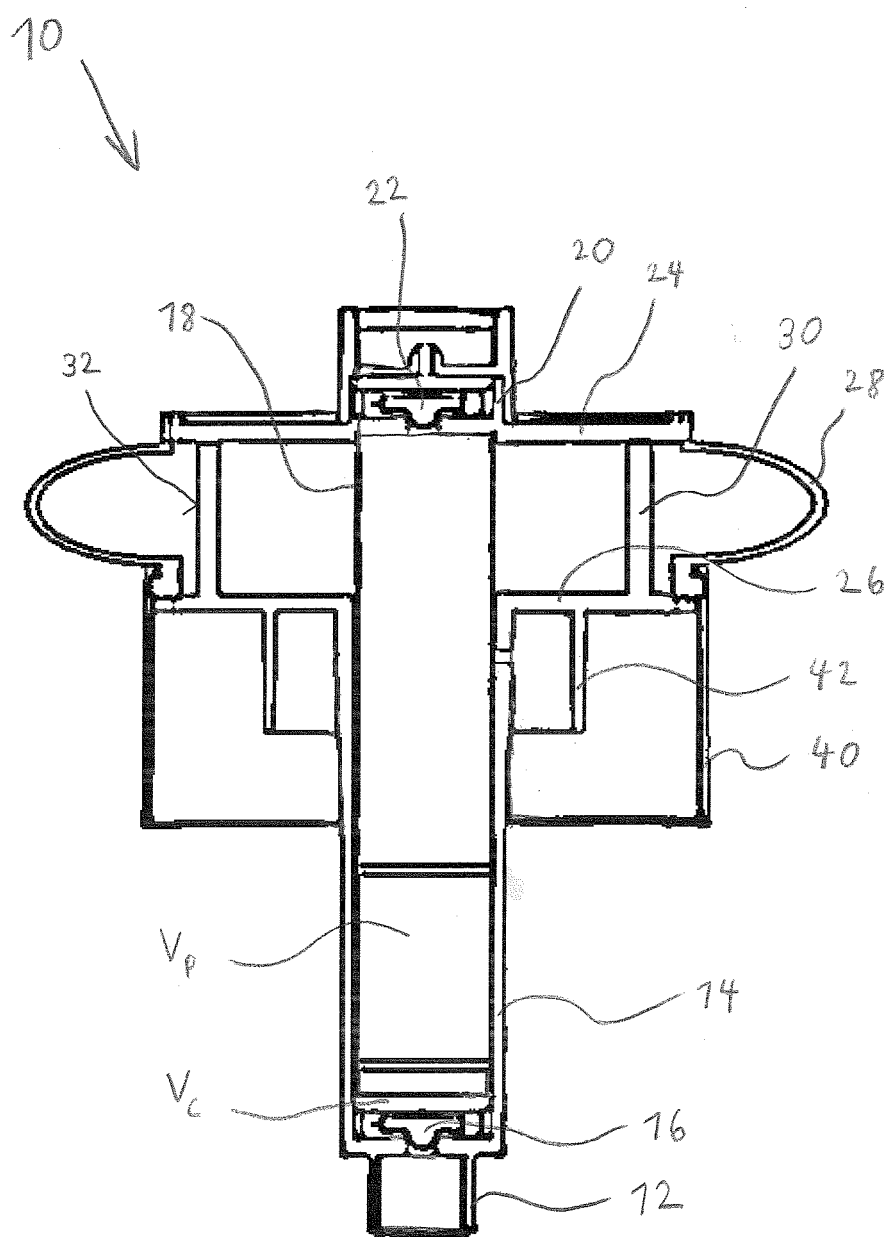


Fig. 2



EUROPEAN SEARCH REPORT

 Application Number
 EP 13 19 0461

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 91/03321 A1 (MEGAPLAST DOSIERSYSTEME [DE]) 21 March 1991 (1991-03-21) * page 15, line 1 - page 18, line 12; figures 3-5 *	1-15	INV. B05B11/00
X	DE 20 2007 004405 U1 (MEGAPLAST GMBH & CO KG [DE]) 30 August 2007 (2007-08-30) * paragraphs [0029] - [0031], [0041] - [0042]; figures 1,2 *	1,5-15	
X	DE 40 35 922 A1 (MEGAPLAST DOSIERSYSTEME [DE]) 14 May 1992 (1992-05-14) * column 4, lines 7-18; figure 4 *	1,5-15	
X	FR 2 735 452 A1 (CHOPIN MICHEL [FR]) 20 December 1996 (1996-12-20) * page 2, line 35 - page 5, line 1; figure 1 *	1,5-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			B05B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 14 March 2014	Examiner Lostetter, Yorick
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 13 19 0461

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The members are as contained in the European Patent Office EDP file on
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14-03-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9103321 A1	21-03-1991	DE 3928521 A1 WO 9103321 A1	14-03-1991 21-03-1991
DE 202007004405 U1	30-08-2007	DE 202007004405 U1 WO 2007122087 A1	30-08-2007 01-11-2007
DE 4035922 A1	14-05-1992	NONE	
FR 2735452 A1	20-12-1996	NONE	

EPO FORM P0459

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 9628257 A [0002]