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DESCRIPTION

FIELD OF THE INVENTION

[0001] The invention pertains to a pressure control system provided for maintaining a constant predetermined excess pressure in a fluid dispensing container.

BACKGROUND OF THE INVENTION

[0002] Such a pressure control system is described in WO-A-2005/082744, wherein the high-pressure vessel is substantially cylindrical with a tapered neck portion and a flange, on which a ring-shaped insert or closure with a step-like funnel is mounted. The pressure control device of this document is provided within a ring-shaped closure by a cup-like cylinder having a closed end and an open end, in which a piston with a downward protruding stem and a broader cylindrical end portion is movably mounted. The piston is sealed by an O-ring to the inner wall of the cup-like cylinder and can be moved in a reciprocating manner. At the open end of the step-like funnel an O-ring is pinched by a ring-cylinder, whereas the broader cylindrical portion of the stem and the O-ring provide a valve which is moved in a reciprocating manner by the pressure of a pressurizing gas, i.e. air, in the chamber formed by the piston and the cup-like cylinder with its closed end.

[0003] When mounting the piston into the cup-like cylinder, it is very important that the outer wall of the O-ring will not be impaired or damaged. Already very small incisions will influence the life-span of the pressure control device, since pressurized gas or air could escape and diminish the reference pressure gradually. A similar problem occurs with the pinched O-ring, which provides a valve with the broader cylindrical portion of the stem. Although in use the piston and the stem will have a reciprocating movement of less than one mm, there will be little wear, which influences the longevity of the pressure control system.

OBJECT OF THE INVENTION

[0004] It is an object of the present invention to provide a pressure control system with a high-pressure vessel, which is of simple construction and may be assembled and pressurized in an easy manner. Another object of the invention is to provide a pressure control device, in which wear of the parts can be neglected. These objects of the invention are accomplished by a pressure control system with the features of claim 1.

[0005] According to embodiments of the invention, the pressure control system for maintaining a constant predetermined excess pressure in a fluid dispensing container comprise a high-pressure plastic vessel having an inner chamber and a closed end and an open end, and a

pressure control device having a valve and mounted on the open end of the high-pressure vessel, whereas a passageway is provided from the inner chamber to the outside, which is controlled by the valve. A piston with a protruding stem is provided in a guide member, whereas between the guide member and the piston a chamber with a gas with a reference pressure smaller than the high pressure is enclosed. The high pressure vessel is closed by a closure with a central bore of smaller diameter than the diameter of the stem, and the piston end remote from the protruding stem is pressurized by the fluid in the fluid dispensing container. Through the smaller diameter of the central bore compared to the diameter of the stem, the stem may seal the central bore. The pressure from the fluid in the fluid container pushes the stem against the central bore, so that the high pressure vessel will be closed gas-tight.

[0006] According to an embodiment of the pressure control system the piston is urged towards the closure of the high-pressure vessel by a resilient means. The resilient means is a second elastic disc, which is fixed to the outer rim of the guide member. By the resilient means the pressure from the stem against the central bore can be increased.

[0007] According to another embodiment of the pressure control system the bore of the closure is covered by a first elastic disc which is fixed between the guide member and the closure. The central bore will be closed gas-tight by the first elastic disc.

[0008] Further advantages will follow from the description below.

BRIEF DESCRIPTION OF THE FIGURES

[0009] In the following, the invention is described in greater detail, by way of example, with reference to the accompanying drawings.

Fig. 1

a pressure control system with a piston and a guide member guiding the piston in an open condition of the valve, and

Fig. 2

the pressure control system of Fig. 1 wherein the valve is in a closed condition.

DETAILED DESCRIPTION

[0010] Figure 1 shows a pressure control system 1 with a piston 2 having a broad cylindrical part 4 and a downwards protruding stem 3, which piston is guided in a guide member 5. The guide member 5 has the form of a circular cylinder with a circular disc 6 having a first central bore 7. The diameter of the stem 3 is slightly less than the diameter of the first central bore 7,

so that the stem 3 is more or less airtight moveable in a reciprocating manner in the central bore 7. The outer wall of the broad cylindrical part 4 of the piston 2 is more or less gas-tight moveable along the inner wall of the guide member 5. Between the bottom of the piston and the opposite inner bottom wall of the guide member 5 a reference pressure chamber 8 is provided. The guide member 5 is mounted press-fit in a cup-like closure 9, which has a second central bore 10 with a diameter smaller than the diameter of the protruding stem 3, so that the second bore 10 can be closed by the stem 3. As can be seen in Figures 1 and 2, the end of the stem 3 is rounded and the entrance of the bore 10 is conical commensurate to the rounding of the stem 3. Between the guide member 5 and the closure 9 a channel or passageway 11 is provided, so that a pressurized gas or air can flow from bottom to the top of the closure 9. The channel 11 has only a small cross-section of less than about two mm. An elastic disc 12 is fixed between the circular disc 6 of the guide member 5 and the bottom part 14 of the closure 9. Thus, this first elastic disc or gasket 12 is clamped by the lower wall of the guide member 5 and the inner wall of the closure 9. On top of the guide member 5 a second elastic disc or gasket 13 is provided which is fixed by a ring-shaped stop member 15 which is also mounted press-fit in the closure 9.

[0011] The piston 2 is thus enclosed by the first gasket 12 and the second gasket 13 which as resilient means urge the piston 2 in a rest position. The closure 9 is mounted on a high-pressure vessel - indicated by the number 16. The ring-shaped stop member 15 opens into a fluid dispenser container - indicated by the number 17.

[0012] In Figure 2 the pressure control system 1 is shown wherein the valve, provided by the protruding stem 3, the first gasket 12 and the second central bore 10 of the closure 9, is closed. In this closed condition the pressure in the fluid dispensing container 17 and in the reference pressure chamber 8 are essentially equal. If the pressure in the fluid dispensing container 17 drops because fluid is dispensed, through a push-button (not shown) of the container 17, the piston 2 is urged upwards and the valve is opened, so that a gas with high pressure can flow through the passageway 11 into the container 17 until the pressure in the container 17 and the pressure in the reference pressure chamber 7 plus the closing pressure of the stem 3 towards the bore 10 are equal again, under which condition the valve is closed.

[0013] The length of the stem 3 is defining the volume of the reference pressure chamber 8. If the length of the stem 3 is enlarged, the thickness of the broad cylindrical part 4 of the piston 2 is reduced accordingly.

[0014] All parts of the pressure control system 1 as described above are made of plastic. Although the piston 2 is usually solid, the cylindrical part 4 of the piston may be hollow. Further, the pressure control system 1 is normally circular cylindrical but can have also a square cylindrical form. Any other cylindrical forms can also be used.

[0015] The parts of the pressure control system 1 are mounted under atmospheric pressure, so that in the rest condition (Fig. 1) of the system the pressure in the reference chamber 8 is about 1 bar. If the valve is closed (Fig. 2), i.e. when the stem 3 with the first gasket 12 is just

closing the bore 10, the pressure in the reference chamber 8 plus the closing pressure of the stem 3 should be equal to the pressure in the fluid dispensing container 17. If the stem 3 of the piston 2 is longer, the volume of the reference chamber 8 will be larger, which means that the ratio between the pressure difference and the stroke of the stem 3 will be smaller, so that a more subtle pressure control is possible.

[0016] It is further clear to the skilled person that the first and second gaskets 12 and 13 are not absolutely necessary for the functioning of the pressure control system 1 as described above. If the outer wall of the broad cylindrical part 4 of the piston is large enough, the piston will be sealed gas-tight against the inner wall of the guide member 5, so that the outer end of the stem 3 in itself will already close the bore 10 sufficiently if in the closing position. The stem 3 should then also be moveable gas-tight in the central bore 7.

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- [WO2005082744A \[0002\]](#)

Patentkrav

- 5 1. Trykstyresystem, som er tilvejebragt til at bibeholde et konstant forudbestemt overtryk i en fluidafgivelsesbeholder (17), som omfatter en højtryksplasttank (16), der har et indre kammer og en lukket ende og en åben ende, og en trykstyreindretning, som har en ventil og er monteret på den åbne ende af højtrykstanken, mens der er tilvejebragt en passage (11) fra det indre kammer til den udvendige side, som styres ved hjælp af ventilen, der er tilvejebragt et stempel (2) med et udragende skaft (3) i et føringselement (5), **kendetegnet ved, at** der mellem bunden af stemplet (2) og den modstående indre væg af føringselementet (5) er indesluttet et kammer (8) med en gas med et referencetryk, der er mindre en højtrykket, og højtrykstanken (16) er lukket ved hjælp af en tillukning (9) med en midterboring (10) med en mindre diameter end diameteren af skaftet (3), og stempelenden, der befinder sig i afstand fra det udragende skaft (3), sættes under tryk ved hjælp af fluiden i fluidafgivelsesbeholderen (17).
- 10
- 15
- 20 2. Trykstyresystem ifølge krav 1, **kendetegnet ved, at** stemplet (2) presses mod underdelen (14) af tillukningen (9) ved hjælp af et eftergiveligt middel.
- 25 3. Trykstyresystem ifølge krav 2, **kendetegnet ved, at** det eftergivelige middel er en anden elastisk skive (13), som er fikseret til den ydre kant af føringselementet (5).
- 30 4. Trykstyresystem ifølge et af kravene 1 til 3, **kendetegnet ved, at** boringen (10) af tillukningen (9) er dækket af en første elastisk skive (12), der er fikseret mellem føringselementet (5) og tillukningen (9).

DRAWINGS

