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# (54) AN INK CARTRIDGE

TINTENPATRONE

CARTOUCHE D ENCRE

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## Description

**[0001]** The present invention relates to an ink cartridge for a universal printer.

**[0002]** In the conventional art, for example, as recited in the specification of Chinese Patent Application No. 03102633.8 (publication number : CN 1481996A) entitled "Ink Cartridge and Method of Regulating Fluid Flow", a negative pressure generating mechanism using a valve structure constituted of a membrane and a spring is employed in an ink cartridge. The negative pressure generating mechanism is disposed between an ink storage region and an ink supply port. Generally speaking, the membrane is pressed onto a valve seat by a force exerted by a spring, so as to seal an ink channel. When a print record header injects ink to cause a negative pressure exceeding a specified value at an ink supply port side, the membrane will depart from the valve seat against the force exerted by the spring, thereby opening the ink channel temporarily. Thus the ink flows towards the ink supply port from the ink storage region and at the same time, the negative pressure at the ink supply port side decreases to below the specified value.

**[0003]** Each of EP-A-1199178, EP-A-1125747, EP-A-1016533 and US-16193364 discloses an ink cartridge with a differential pressure mechanism between the ink flow port and the ink supply chamber.

**[0004]** Consequently the number of the parts and components is increased since the spring is used. Furthermore, in order to assemble the spring, the manufacturing efficiency of the ink cartridges may possibly be lowered. Meanwhile, in order to balance the pressure inside an ink cartridge, the ink storage region must be communicated with atmospheric air and thus an ink leakage prevention mechanism needs to be added.

**[0005]** In view of the aforementioned problems, the present invention is directed to an ink cartridge for a universal printer which uses a simple valve structure to stably provide ink to a print record header.

**[0006]** Thus viewed from a first aspect the present invention provides an ink cartridge for a universal printer comprising a liquid accommodation chamber and an air pressure-difference valve connected to the liquid accommodation chamber to keep the liquid accommodation chamber in a negative pressure state, wherein the air pressure-difference valve comprises:

a valve member made of an elastic material and being a circular valve membrane with a round hole at its center having a rim;
a valve casing matching the valve member;
a front valve body or an ink storage chamber;
a rear valve body or a cap;
an air hole;
an air tank formed in the rear valve body; and
a boss protruding into a central portion of a bottom of the air tank,
wherein the round hole is engaged by a boss protruding from the rear valve body.

**[0007]** In order to achieve the aforementioned objective, the present invention adopts an air pressure-difference valve to keep a liquid accommodation chamber in a negative pressure state. The air pressure-difference valve is connected to the liquid accommodation chamber to keep it in a negative pressure state. The air pressure-difference valve may be disposed in the ink storage chamber or on a front cover. The front cover or the ink storage chamber has the air hole in communication with atmospheric air.

**[0008]** Based on the aforementioned solution, the air pressure-difference valve of the present invention is used to control an overall negative pressure of a gas and liquid inside the ink storage chamber. The present invention can omit springs and reduces the number of parts and components thereby reducing requirements for manufacturing processes and the cost. The air pressure-difference valve may be a check valve which prevents the ink from leaking out of the ink storage chamber. Thus an ink leakage prevention mechanism can be omitted and the cost is further reduced.

**[0009]** Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only.

**[0010]** The present invention will become more fully understood from the detailed description given herein below for illustration only, and thus is not limitative of the present invention, and wherein:

FIG. 1 is a schematic view illustrating the relationship between installation positions of an air pressure-difference valve of the present invention.

FIG. 2 is a schematic structural view of the air pressure-difference valve of the present invention.

**[0011]** The present invention will be described in detail in the following embodiment.

**[0012]** Referring to FIGs. 1 and 2, the present invention includes a liquid accommodation chamber and an air pressure-difference valve. The air pressure-difference valve includes a front valve body (or an ink storage chamber) 1, a rear valve body (or a cap) 6, an air hole 2, and an air tank 3. A pressure adjustment mechanism is disposed in the ink storage chamber 1 or on a front cover. The air tank 3 is formed in the rear valve body 6. A boss protrudes at a central portion of a bottom of the air tank. A small round hole having a rim is formed in the valve membrane 4. The round hole is pressed by the boss protruding from the rear valve body 6. The air pressure-difference valve is installed in the ink storage chamber I or on the front cover. The front cover or the ink storage chamber 1 has the air hole 2 in communication with at-

mospheric air.

## Claims

1. An ink cartridge for a universal printer comprising a liquid accommodation chamber and an air pressure-difference valve connected to the liquid accommodation chamber to keep the liquid accommodation chamber in a negative pressure state, wherein the air pressure-difference valve comprises:

   a valve member (4) made of an elastic material and being a circular valve membrane with a round hole at its center having a rim;
   a valve casing matching the valve member;
   a front valve body or an ink storage chamber (1);
   a rear valve body or a cap (6);
   an air hole (2);
   an air tank (3) formed in the rear valve body; and
   a boss protruding into a central portion of a bottom of the air tank,

   wherein the round hole is engaged by a boss protruding from the rear valve body.

2. The ink cartridge for a universal printer according to claim 1, wherein an ink intake port in connection with an ink channel is disposed at the base of the ink cartridge.

3. The ink cartridge for a universal printer according to claim 2, wherein the air pressure-difference valve is a check valve mechanism.

4. The ink cartridge for a universal printer according to claim 3, wherein a diameter of the check valve mechanism is in a range of 10 mm to 30 mm.

5. The ink cartridge for a universal printer according to claim 4, wherein the check valve is disposed on any surface of the ink cartridge.

## Patentansprüche

1. Tintenpatrone für einen Universaldrucker, umfassend eine Flüssigkeitsaufnahmekammer und ein Luftdruckdifferenzventil, das an die Flüssigkeitsaufnahmekammer angeschlossen ist, um die Flüssigkeitsaufnahmekammer in einem Unterdruckzustand zu halten, wobei das Luftdruckdifferenzventil umfasst:

   ein Ventilelement (4), das aus einem elastischen Material besteht und eine kreisförmige Ventilmembran mit einem runden Loch in der Mitte mit einem Rand ist;
   ein Ventilgehäuse, das zu dem Ventilelement passt;
   einen vorderen Ventilkörper oder eine Tintenspeicherkammer (1) ;
   einen hinteren Ventilkörper oder einen Deckel (6);
   ein Luftloch (2);
   einen Lufttank (3), der in dem hinteren Ventilkörper ausgebildet ist; und
   einen runden Vorsprung, der in einen mittleren Abschnitt eines Bodens des Lufttanks ragt,
   wobei das runde Loch mit einem runden Vorsprung in Eingriff steht, der von dem hinteren Ventilkörper absteht.

2. Tintenpatrone für einen Universaldrucker nach Anspruch 1, wobei eine Tinteneinlassöffnung in Verbindung mit einem Tintenkanal an der Basis der Tintenpatrone angeordnet ist.

3. Tintenpatrone für einen Universaldrucker nach Anspruch 2, wobei das Luftdruckdifferenzventil ein Rückschlagventilmechanismus ist.

4. Tintenpatrone für einen Universaldrucker nach Anspruch 3, wobei ein Durchmesser des Rückschlagventilmechanismus in einem Bereich von 10 mm bis 30 mm liegt.

5. Tintenpatrone für einen Universaldrucker nach Anspruch 4, wobei der Rückschlagventilmechanismus auf einer beliebigen Oberfläche der Tintenpatrone angeordnet ist.

## Revendications

1. Cartouche d'encre pour une imprimante universelle comprenant une chambre de logement de liquide et une soupape de différence de pression d'air raccordée à la chambre de logement de liquide pour maintenir la chambre de logement de liquide dans un état de pression négative, dans laquelle la soupape de différence de pression d'air comprend :

   un élément de soupape (4) réalisé avec un matériau élastique et étant une membrane de soupape circulaire avec un trou rond au niveau de son centre ayant un bord ;
   un boîtier de soupape correspondant à l'élément de soupape ;
   un corps de soupape avant ou une chambre de stockage d'encre (1) ;
   un corps de soupape arrière ou un capuchon (6) ;
   un trou d'air (2) ;
   un réservoir d'air (3) formé dans le corps de soupape arrière ; et

un bossage faisant saillie dans une partie centrale d'un fond du réservoir d'air,
dans laquelle le trou rond est mis en prise par un bossage faisant saillie du corps de soupape arrière.

**2.** Cartouche d'encre pour une imprimante universelle selon la revendication 1, dans laquelle un orifice d'admission d'encre en raccordement avec un canal d'encre est disposé à la base de la cartouche d'encre.

**3.** Cartouche d'encre pour une imprimante universelle selon la revendication 2, dans laquelle la soupape de différence de pression d'air est un mécanisme de soupape anti-retour.

**4.** Cartouche d'encre pour une imprimante universelle selon la revendication 3, dans laquelle un diamètre du mécanisme de soupape anti-retour est de l'ordre de 10 mm à 30 mm.

**5.** Cartouche d'encre pour une imprimante universelle selon la revendication 4, dans laquelle la soupape anti-retour est disposée sur n'importe quelle surface de la cartouche d'encre.

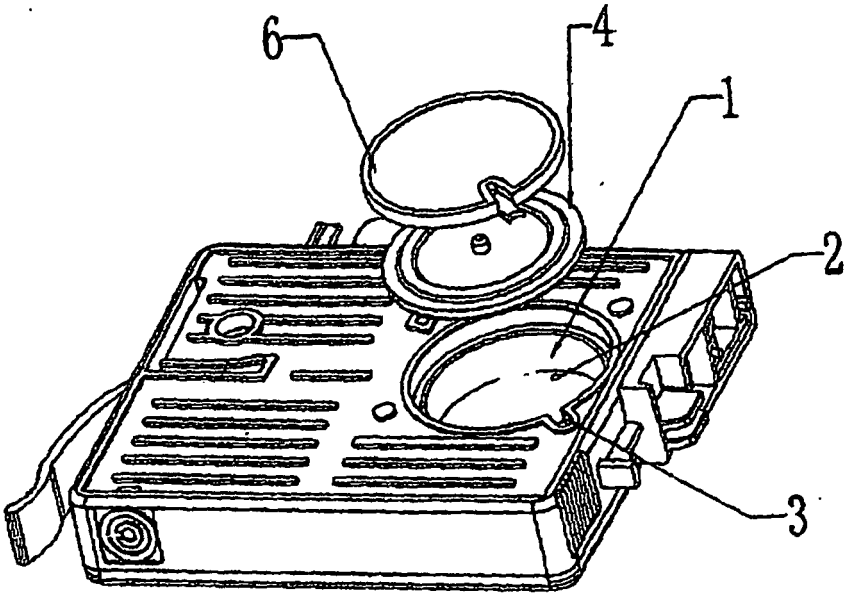


FIG.1

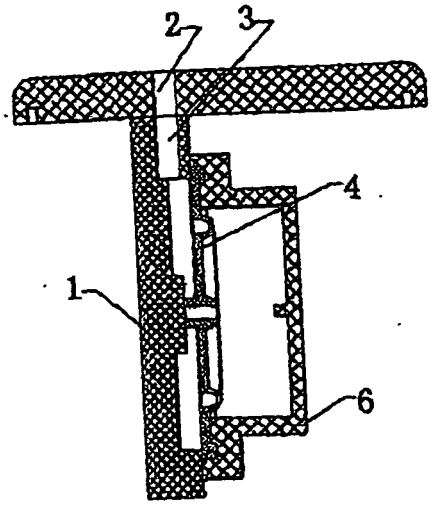


FIG.2

## REFERENCES CITED IN THE DESCRIPTION

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