

A METHOD AND DEVICE FOR REFILLING INK INTO AN INK CARTRIDGE

BACKGROUND OF THE INVENTION

1. Field of the Invention

5 The present invention relates to a method and device for refilling ink into an ink cartridge, especially to a method and device by which 95% of different kinds of the empty ink cartridges may be refilled with ink.

2. Background of the Invention

10 The conventional ink cartridge within the printer is used to store a predetermined amount of ink. During printing, the ink with proper volume will supply to the injecting head so that the ink may be injected to a paper. This conventional design is widely used and developed by various companies. However, the specifications of ink cartridges of different trademarks are different, and when the ink within the ink cartridge has been exhausted, the ink cartridge must be updated. If the printing quantity is large, the
15 frequency for updating the ink is also increased. It takes more money of the user for using the conventional ink cartridge, while the profit of the manufacturers is increased. In fact, the lifetime of the injecting head is longer than the ink cartridge being only used one time (about 15 times). Thus this conventional design of the ink cartridge has consumed large amounts of ink cartridges, and has bad effect to environment
20 protection. Also, the price of the ink cartridge about 20~40 US dollars can not be accepted by the user. This price is 15% ~ 20% of the printer price. Thus it is needed to improve this drawback in order to save more money for a customer and save more resource.

25 In a prior device for refilling the ink into the ink cartridge, during refilling ink into the ink cartridge, the local structure of the ink cartridge will be destroyed. Thus the efficiency of refilling the ink into the ink cartridge is only about 30%. The environment protection can not be achieved effectively.

SUMMARY OF THE INVENTION

Accordingly, the object of the present invention is to provide a method for refilling ink into an ink cartridge, wherein the original mechanism of the ink cartridge is sustained, and it is easy to be operated.

5 A further object of the present invention is to provide a method for refilling ink into an ink cartridge, wherein the efficiency of refilling ink into the ink cartridge may attain a value of 95%.

Another object of the present invention is to provide an auxiliary device for easily refilling ink into an ink cartridge.

10 In order to attain aforementioned objects, the present invention provides a method for refilling ink into an ink cartridge comprising the following steps:

(1) sealing all the ink outlet holes and air vent holes by sealing objects;

(2) forming at least one drilling hole in proper position of the ink filling chamber;

(3) refilling ink into the ink cartridge by an injector from the drilling hole;

15 (4) sealing the drilling hole by a proper sealing object; and

(5) positioning the ink cartridge in a normal position and retaining the sealing object, after the ink having not overflowed, the overflowed ink around the ink outlet will be absorbed;

20 Thereby, under the condition that the original mechanism does not been destroyed, the efficiency for refilling ink may attain a value of 95%. The method of the present invention may be used in different kinds of injecting heads or used in an ink cartridge without any injecting head.

25 In addition, the present invention also provides an auxiliary device for refilling ink into an ink cartridge, which comprises a drilling base with a fixing piece for fixing the ink cartridge so that the ink cartridge may be adhered on the base, at least one

perforating screw hole is installed on a proper position of the base with respect to the ink cartridge, a drilling means having a tip pin for penetrating the ink cartridge through the perforating screw hole, and an injector for injecting ink into the ink cartridge. The tip pin of the drilling means and the injector are independent with each other. The
5 injector is an injecting needle tube, and the tip pin is a "T" shape drilling piece, one end of which is a handle for applying force and the other end thereof is a stud with a proper tip pin of the front end thereof. The tip pin may has a conic shape, a triangular, a rectangular, a polygonal or a star-like taper shape. Thereby, a drilling hole may be drilled by the stud on the ink cartridge of the printer so that the ink may be refilled.

10 The present invention will be better understood and its numerous objects and advantages will become apparent to those skilled in the art by referencing to the following drawings in which:

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is the block diagram of the method for refilling ink into an ink cartridge of
15 the present invention.

Fig. 2 is the exploded view of the embodiment for the device of the present invention.

Fig. 2A is shown various shapes of the tip pin of the drilling means of the present invention.

20 Fig. 3 is a schematic view of the drilling operation for the embodiment of the present invention.

Fig. 4 is a perspective view of the embodiment for refilling ink of the present invention.

25 Fig. 5 is a perspective view of the embodiment of present invention for refilling ink with two holes on the ink cartridge.

Fig. 6 is a perspective view for refilling ink into an EPSON ink cartridge.

Fig. 7 is a schematic view for injecting ink into the ink cartridge of Fig. 6.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in Figs. 1, 2 and 3, the method for refilling ink into an ink cartridge of the present invention comprises the following steps:

- 5 (1) All the ink outlet holes and air vent holes are sealed by proper sealing pieces; if the ink cartridge 2 desired to be refilling with ink has an injecting head (not shown), the injecting head is also sealed. It should be processed carefully in order not to destroy the injecting head.
- 10 (2) At least one drilling hole 21 is formed on the proper position of the ink cartridge 2. The drilling hole 21 is installed on the upper limit position of the ink cartridge 2 for filling ink. The device of the present invention may be used for drilling the hole 21.
- (3) An injector 3 is used to fill ink 4 into the drilling hole 21.
- (4) A proper block piece 5, such as tape or plug, is used to block the drilling hole 21.
- 15 (5) Finally, the ink cartridge 2 is return to a normal position, then the sealing object 1 is removed. Then the inner pressure within the ink cartridge will gradually returned to a normal pressure and the ink 4 will not overflow, wherein the overflowed time of ink 4 is dependent on the filling volume. In general, after 3 ~ 5 minutes, the pressure within the ink cartridge will automatically attain a proper usage pressure. Meanwhile, the overflow ink will be removed by absorption method. If the ink
20 cartridge has an injecting head, the absorption must be performed by an fiber towel, when rubbing, using the fiber towel slightly rubs the ink cartridge upwards and downwards. The force applied forwards, backwards, rightwards and leftwards or a large applied force are not allowed, otherwise the precise injecting head will be destroyed, and the printing effect will be affected. Therefore, the effect of refilling ink
25 into the cartridge can not be achieved.

Thereby, by the method of the present invention, the empty ink cartridge may be refilled with ink. If the ink cartridge is stored, the outlets of the ink and air vent hole may be sealed. This is similar to the prior usage manner, thus the operation thereof is

very convenient. Through experiment, the efficiency of refilling ink into the cartridge may attain 95%. Thus, the resource and money are effectively saved.

Referring to Figs. 2 and 3, in order to easily perform the method of refilling ink into the ink cartridge, in the present invention, a practical auxiliary device is provided, including:

a drilling base 6 having an "H" shape, and at least one perforating screw hole 61 is installed on the front and rear ends thereof. Fixing holes 63 are installed within the two concave portions 62 on the two sides of the drilling base 6 for installing a fixing piece 64. The fixing piece 64 is an opened rectangular and flanges 65 are formed on the distal ends thereof for being located into the fixing holes 63. The perforating screw hole 61 is located on the proper position of the ink cartridge 2 so that the ink cartridge 2 can be inserted into the center of the fixing piece 64.

A drilling means 7 is a stud 71 with a tip pin 73, it may be used to perforate the screw hole 61 so to prick into the ink cartridge 2. Then the injector 3 is used to inject ink into the ink cartridge 2. The injector 3 is an injecting needle tube and drilling means 7 is a "T" shape drilling piece. A through hole 72 is installed on the distal end of stud 71 for being penetrating by a handle 74. A tip pin 73 with a proper length is formed on the front end of the stud. The tip pin 73 may has a conic shape, triangular, rectangular, polygonal or star-like taper shape as desired. However, the inner diameter of the hole of the ink cartridge 2 penetrated by the tip pin 73 should be apparently larger then the outer diameter of the injecting needle.

Referring to Figs. 3 and 4, the ink cartridge 2 may be located within the remaining space between the fixing piece 64 and the drilling base 6. The ink cartridge 2 and the fixing piece 64 are held by a hand and rotating the adjusting handle 74 so that the tip pin 73 will contact with the ink cartridge 2, and then the drilling means 7 is inserted into the ink cartridge 2, the tip pin 73 will be enforced into one side of the ink cartridge 2 to generate a drilling hole 21. Then, an injector further injects ink into the ink cartridge 2 from the drilling hole 21. Since the drilling hole 21 is perforated by the tip pin 73, the diameter of the drilling hole 21 is large then that of the tip pin. Therefore,

during refilling ink, the air may be released from the gap in the periphery of the hole so that the refilling operation may be performed successfully. Further, as shown in Fig. 5, at least two drilling holes 21a and 21b are installed on the wall of the ink cartridge 2 so that during refilling ink, one hole may be used to inject ink, and the other hole is used to vent air.

As shown in Figs. 6 and 7, the method and device of the present invention are particularly suitable to be used in an ink cartridge with a spacer therewithin. For example, in the EPSON SO20047/MJIC4 type ink cartridge, the ink cartridge 2 is only used to store ink and has no injecting head, while a spacer 22 is installed within the ink cartridge 2. The filling chamber with an absorption body 23 is an ink outlet section 24, while another filling chamber is a primary ink storing section 25. Although, originally, an ink injecting hole 8 is installed on the ink outlet section 24, in the normal pressure, the injecting ink can not flow through the absorption body 23 and the through hole 26 under the spacer 22, thus the ink can not be injected into the primary storage section 25. Therefore, the injecting ink is reduced greatly. However, the present invention may be used to overcome this drawback. In the present invention, two drilling holes 21a and 21b are further installed on the primary storing section 25 of the ink cartridge 2 so that the ink may be injected into the section 25 directly, and the amount of ink filled by the method of the present invention is almost equal to that of original ink cartridge.

In summery, the present invention is actually has an efficiency of 95% to refilling all kinds of ink cartridges. Although certain preferred embodiment of the present invention has been shown and described in detail, it should be understood that various changes and modification may be made therein without departing from the scope of the appended claims.

**What is Claimed is:**

1. A method for refilling ink into an ink cartridge comprising the following steps:

(1) sealing all the ink outlet holes and air vent holes by sealing pieces;

5 (2) forming at least one drilling hole in a proper position of the ink filling chambers;

(3) refilling ink into the ink cartridge by an injector from the drilling hole;

(4) blocking the drilling hole by a proper blocking object; and

10 (5) positioning the ink cartridge to a normal position and retaining the sealing object, after the ink having not overflowed, the overflow ink around the ink outlet being absorbed;

thereby, the ink cartridge may be refilled in the normal pressure.

2. The method for refilling ink into an ink cartridge as recited in claim 1, wherein the drilling hole is installed on the proper position of the ink cartridge for connecting the filling chamber and outer air and for refilling ink.

15 3. The method for refilling ink into an ink cartridge as recited in claim 1, wherein the outlet of the ink cartridge includes an injecting head.

4. An auxiliary device for refilling ink into an ink cartridge comprising:

a fixing piece installed with an opened rectangular piece with two flanges;

20 a drilling base, at least one perforating screw hole being installed on the proper position thereof and fixing holes being installed on the two concave sides of the base for being clamped by a fixing piece;

a drilling means, one end of which has a handle and the other end of which has a stud with a proper tip pin, the stud may be used to penetrate the ink cartridge;

a sealing piece for sealing the air vent opening on the ink cartridge;



an injector for injecting ink into the ink cartridge;

a block piece for blocking air so not to vent outwards;

wherein, the two flanges of the fixing piece may be inserted into the fixing holes on the two concave sides of the drilling base, respectively; then the sealed ink cartridge to be refilled is disposed in a remaining space between the drilling base and the fixing piece, then the tip pin of the drilling means is penetrated into the perforating screw hole, next the stud is used to drill a hole on one side of the ink cartridge, next the injector is used to fill proper amount of ink into the ink cartridge from the drilling hole, finally the block piece will block the drilling hole on the ink cartridge.

10 5. An auxiliary device for refilling ink into an ink cartridge comprising:

a drilling means, one end of which has a handle and the other end of which has a stud with a proper tip pin, the stud may be used to penetrate the ink cartridge;

a sealing piece for sealing the air vent opening on the ink cartridge;

an injector for injecting ink into the ink cartridge;

15 a block piece for blocking air so not to vent outwards;

wherein, the tip pin of the drilling means will penetrate into the ink cartridge on a proper position, next the stud is used to drill a hole, then the injector is used to fill proper amount of ink into the ink cartridge from the drilling hole, finally the block piece will block the drilling hole on the ink cartridge.

20 6. The method for refilling ink into an ink cartridge as recited in claim 1, wherein the sealing piece and blocking piece may be a thin film with one surface being coated by sticky glue.

25 7. The device for refilling ink into an ink cartridge as recited in claim 4, wherein each of the sealing piece and blocking piece is a thin film with one surface being coated by sticky glue.



8. The device for refilling ink into an ink cartridge as recited in claims 5, wherein each of the sealing piece and blocking piece is a thin film with one surface being coated by sticky glue.

9. The method for refilling ink into an ink cartridge as recited in claim 1, wherein
5 the block piece is a flexible plug for blocking air and engaging within the drilling hole.

10. The device for refilling ink into an ink cartridge as recited in claim 4, wherein the block piece is a flexible plug for blocking air and engaging within the drilling hole.

11. The device for refilling ink into an ink cartridge as recited in claim 5, wherein
10 the block piece is a flexible plug for blocking air and engaging within the regenerated hole.

12. The device for refilling ink into an ink cartridge as recited in claim 4, wherein the tip pin is a conic shape, a triangular, a rectangular, a polygonal or a star-like taper shape.

13. The device for refilling ink into an ink cartridge as recited in claim 5, wherein
15 the tip pin is a conic shape, a triangular, a rectangular, a polygonal or a star-like taper shape.