

**DEVICE AND METHOD OF REFILLING INK INTO INK
CARTRIDGES FOR INK-JET PRINTERS**

5 FIELD OF THE INVENTION

The present invention relates, in general, to a device and method of refilling ink into ink cartridges for ink-jet printers and, more particularly, to an improvement in such a device and method to expel a
10 predetermined amount of ink and/or air from an ink cartridge after refilling ink into the cartridge, thereby securing a desired ink passage in the ink-jet nozzle of the cartridge's print head in addition to cleaning the
15 nozzle, the device and method of this invention thus finally allowing an effective recycling of such ink cartridges.

BACKGROUND OF THE INVENTION

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As well known to those skilled in the art, conventional printers have been classified into several types, or dot printers, ink-jet printers and laser printers. Of such conventional printers, the ink-jet
25 printers use thermal-type ink cartridges, which are filled with ink and distribute ink under pressure onto papers through the ink-jet nozzle of a print head externally provided on an end wall thereof.

Such thermal-type ink cartridges are typically
30 classified into two types, or sponge-type cartridges and automatic pressure regulation-type cartridges, in accordance with their internal structures. Of the two types, the sponge-type cartridge is individually provided with porous sponge within its interior space for
35 allowing ink to permeate through the sponge and to be

laden in the pores of the sponge. On the other hand, the automatic pressure regulation-type cartridge is individually provided with a pressure-regulating air bag in its interior space. The above air bag automatically
5 regulates the ink-jet pressure of a cartridge so as to maintain a desired ink-jet pressure.

Fig. 1 is a perspective view of a conventional ink cartridge for ink-jet printers. The ink cartridge 10 of Fig. 1 has a print head on an end wall thereof, with an
10 ink-jet nozzle (not shown) being formed in the print head. The above cartridge 10 comprises a specifically designed housing 10a, with an ink supply hole 10c being formed at the top wall of the housing 10a and being used for filling ink into the housing 10a. In the above
15 cartridge 10, a locking projection 10d is provided at the middle of one end corner of the housing's top wall. This locking projection 10d locks the cartridge 10 at a desired position within a printer. A finger-operable grip 10e is provided at the middle of the other end
20 corner of the housing's top wall. This grip 10e is operated by a user when installing or removing the cartridge 10 in or from the printer.

When such an ink cartridge 10 has been preferably and normally used until it is empty, the print head of
25 the cartridge, including the ink-jet nozzle, may preferably retain its normal condition, thus being usable in a further printing process if the housing of the cartridge is refilled with ink. Therefore, most users of ink-jet printers wish to reuse such empty cartridges
30 after refilling ink into the cartridges without purchasing new cartridges. This finally allows the users to save money in addition to prevention of environmental pollution and waste of natural sources. However, an appropriate and effective means for allowing the users to
35 easily refill ink into such empty cartridges has not been

proposed, and so the users of ink-jet printers are regrettably forced to change the empty cartridges with new cartridges.

5 When conventional ink-jet printers are kept out of use for a lengthy period of time, ink in the ink-jet nozzle of the cartridge's print head is dried, thus undesirably blocking the nozzle. In such a case, the user may be forced to change the malfunctioning cartridge with a new one even when the existing cartridge is not
10 emptied.

SUMMARY OF THE INVENTION

Accordingly, the present invention has been made
15 keeping in mind the above problems occurring in the prior art, and an object of the present invention is to provide a device and method of refilling ink into ink cartridges for ink-jet printers, which expels a predetermined amount of ink and/or air from an ink cartridge after refilling
20 ink into the cartridge, thereby securing a desired ink passage in the ink-jet nozzle of the cartridge's print head in addition to cleaning the nozzle, and which thus finally allows an effective recycling of such ink cartridges.

25 In order to accomplish the above object, the present invention provides a device for refilling ink into ink cartridges for ink-jet printers, comprising: a case designed to seat an empty ink cartridge therein during an ink refilling process, the case having a shape capable of
30 covering the lower portion of the cartridge from a first end of the cartridge having a print head to a second end, with both a cutout being partially formed from the bottom wall to a first end wall of the case corresponding to the first end of the cartridge and a locking hook being
35 formed at a second end of the case so as to engage with

a locking projection of the cartridge during the ink refilling process; and a pad removably and upwardly set in the cutout of the case from the bottom wall of the case so as to be positioned just around an ink-jet nozzle of the cartridge during the ink refilling process, the pad consisting of a flat plate, with both a cutout fitting boss integrally formed on a first surface of the plate and a pressure ring formed on a second surface of the plate so as to be brought into air-tight contact with the edge of the ink-jet nozzle when the cartridge is completely seated in the case.

The present invention also provides a method of refilling ink into ink cartridges for ink-jet printers using the above ink refilling device, comprising the steps of: seating the pad into the case; installing an empty cartridge into the case, with the ink-jet nozzle of the cartridge being brought into air-tight contact with the pad; refilling the cartridge with ink through an ink supply hole of the cartridge; and inserting a suction means into the fluid outlet hole of the pad from the outside of the case and sucking a predetermined amount of ink and/or air from the cartridge so as to secure a desired ink passage in the ink-jet nozzle of the cartridge in addition to cleaning the nozzle.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a perspective view of a conventional ink cartridge for ink-jet printers;

Fig. 2 is an exploded perspective view of a device for refilling ink into ink cartridges for ink-jet

printers in accordance with the primary embodiment of the present invention, with an ink cartridge being shown in a separated position from the device;

5 Fig. 3 is a perspective view of the device of Fig. 2, with the parts of the device being completely assembled together into a single body and the cartridge being completely seated in the device;

10 Fig. 4a is an exploded perspective view of a pad and a pad cover, both being included in the device of Fig. 2 and the cover being used for preventing the ink-jet nozzle of a cartridge from being dried or malfunctioning when the cartridge is removed from a printer and is kept in the device of this invention for a lengthy period of time;

15 Fig. 4b is a perspective view of a pad in accordance with the second embodiment of the present invention and used for preventing the ink-jet nozzle of a cartridge from being dried or malfunctioning when the cartridge is removed from a printer and is kept in the device of this invention for a lengthy period of time;

20 Figs. 5a and 5b are exploded perspective views, respectively showing the construction of ink refill kits individually having the device according to the primary embodiment of this invention;

25 Fig. 6a is an exploded perspective view of a device for refilling ink into ink cartridges for ink-jet printers in accordance with the second embodiment of the present invention, with an ink cartridge being shown in a separated position from the device;

30 Fig. 6b is a side-sectional view of the device of Fig. 6a, with the parts of the device being completely assembled together into a single body and a large-width cartridge being completely seated in the device;

35 Fig. 7a is an exploded perspective view of a device for refilling ink into ink cartridges for ink-jet

printers in accordance with the third embodiment of the present invention, with an ink cartridge being shown in a separated position from the device; and

Fig. 7b is a side view of the device of Fig. 7a, with the parts of the device being completely assembled together into a single body and the cartridge being completely seated in the device.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

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Figs. 2 and 3 show a device for refilling ink into ink cartridges for ink-jet printers in accordance with the primary embodiment of this invention. As shown in the drawing, the ink refilling device 20 according to the primary embodiment comprises a case 22 and a pad 24. The case 22 is designed to seat an empty ink cartridge 10 therein during an ink refilling process and the pad 24 designed to be combined with the case 22, being positioned closely around the ink-jet nozzle 10b of the cartridge's print head during the ink refilling process.

The above case 22 has a shape capable of covering the lower portion of the cartridge 10 from one end having the print head to the other end. A specifically designed cutout 22a is formed at a first bottom corner of the case 22, which corresponds to the cartridge's end wall having the print head. The above cutout 22a continuously extends from a predetermined portion of the bottom wall of the case 22 to a predetermined height of the first end wall of the case 22, thus allowing the pad 24 to be set within the case 22 from the bottom of the case 22 prior to an ink refilling process. An elastic locking hook 22b is provided at the second end of the case 22 for elastically engaging with the locking projection 10d of the cartridge 10 during an ink refilling process. The above locking hook 22b is projected upwardly within the

case 22 and has a slope locking step. This locking step of the hook 22b is specifically designed to allow the locking projection 10d of the cartridge 10 to easily engage with the locking hook 22b. In the ink refilling device 20 of this invention, a fingertip seat is preferably formed on the top surface of the locking hook 22b so as to allow a user to easily finger-operate the hook 22b when seating or removing the cartridge 10 into or from the case 22. In addition, two longitudinal slits are formed on the bottom wall of the case 22 to a length so as to align with opposite sides of the hook 22b, thus allowing the hook 22b to have a desired elasticity.

One the other hand, two longitudinal parallel supports 22c are axially formed on the interior surface of the bottom wall of the case 22. The above supports 22c allow the empty cartridge 10 to be easily and stably seated in the case 22.

The above pad 24 is set in the cutout 22a of the case 22 from the bottom of the case 22 prior to an ink refilling process. The pad 24 consists of a flat plate 24a, with a cutout fitting boss 24b integrally formed on one surface of the plate 24a. The above fitting boss 24b has a profile capable of being substantially seated into the cutout 22a from the bottom of the case 22. A rectangular pressure ring 24c is formed on the other surface of the plate 24a and is brought into close contact with the edge of the jet nozzle 10b of the cartridge 10 when the cartridge 10 is completely seated in the case 2. The plate 24a is thoroughly holed at its center inside the pressure ring 24c, thus having a fluid outlet hole 24d passing through the cutout fitting boss 24b.

In the above pad 24, it is preferable to somewhat depress the central portion of the plate 24a at an area inside the pressure ring 24c, thus allowing the ink-jet

nozzle 10b of the cartridge 10 to be free from coming into contact with the plate 24a when the cartridge 10 is seated in the case 22.

5 In order to refill ink into an empty cartridge 10 using the above device 20, the pad 24 is primarily seated in the cutout 22a of the case 22, with the boss 24b of the pad 24 being fitted into the cutout 22a. Thereafter, the cartridge 10 is seated in the case 22 as follows. That is, the cartridge 10 is primarily inserted into the
10 case 22 in a way such that the ink-jet nozzle 10b is positioned around the plate 24a of the pad 24. Thereafter, the other end portion of the cartridge 10, having the locking projection 10d, is forced downwardly to be inserted into the case 22.

15 When the end portion of the cartridge 10, having the locking projection 10d, is inserted into the case 22 downwardly as described above, the locking projection 10d of the cartridge 10 pushes the locking hook 22b of the case 22, thus allowing the hook 22b to be elastically
20 bent downwardly. At a time the locking projection 10d just passes over the locking hook 22b, the elastic hook 22b quickly restores its original position, thus engaging with the locking projection 10d and stably holding the cartridge 10 within the case 22. In such a case, the
25 bottom wall of the cartridge 10 is supported on the two parallel supports 22c within the case 22.

When the cartridge 10 is completely seated in the case 22 as described above, the pressure ring 24c is brought into close contact with the edge of the ink-jet
30 nozzle 10b. In such a case, a desired space is formed between the nozzle 10b and the plate 24a of the pad 24 since the central portion of the plate 24a inside the pressure ring 24c is depressed. Therefore, the pad 24 of the device 20 is free from damaging the ink-jet nozzle
35 10b.

When the cartridge 10 is completely seated in the case 22 of the device 20 of this invention, the cartridge 10 is refilled with new ink. After the cartridge 10 is refilled with new ink, the suction tip of a suction means
5 (not shown) is inserted into the fluid outlet hole 24d of the pad 24 and sucks a predetermined amount of ink and/or air from the cartridge 10, thus securing a desired ink passage in the ink-jet nozzle 10b in addition to cleaning the nozzle 10b.

10 After the completion of the ink refilling operation, the cartridge 10 is removed from the case 22 as follows. That is, the cartridge 10 is rotated upwardly from the case 22 while being slightly pushed toward the pad 24, with the case 22 and the cartridge 10 being gripped by
15 both hands. The cartridge 10 is easily removed from the case 22. When an ink cartridge 10 is installed into or removed from the case 22, it is preferable to slightly pressurize the locking hook 22b of the case 22 downwardly using a finger positioned on the fingertip seat of the
20 hook 22b. This accomplishes an easier removal of the cartridge 10 from the case 22.

Figs. 5a and 5b are exploded perspective views, respectively showing the construction of ink refill kits individually having the device 20 according to the
25 primary embodiment of this invention. As shown in Fig. 5a, the ink refill kit according to an embodiment of this invention comprises a bottle-type ink container 26 and a suction means 28 in addition to the device 20 of this invention. The ink container 26 consists of a soft
30 container body 26a, with an ink injection tip 26b provided at the externally-threaded mouth of the body 26a. An internally-threaded separate cap 26c is removably tightened to the mouth of the container body 26a to protect the injection tip 26b and to prevent ink
35 of the tip 26b from being dried. The suction means 28,

having a syringe shape, is inserted into the fluid outlet hole 24d of the pad 24 at its suction tip and sucks a predetermined amount of ink and/or air from the cartridge 10, thus securing a desired ink passage in the ink-jet nozzle 10b in addition to cleaning the nozzle 10b after refilling ink into the cartridge 10.

In another embodiment of Fig. 5b, the ink refill kit has a syringe-type ink container 260 in place of the bottle-type container 26 of Fig. 5a. The syringe-type ink container 260 of Fig. 5b comprises a hollow cylindrical body 261 having an injection tip 262 at its distal end. A movable piston 263 is received within the cylindrical body 261, while a rod-shaped cap 264 is fitted over the injection tip 262 of the body 261 so as to prevent an undesirable leakage of ink from the tip 262.

The syringe-type suction means 28 comprises a cylindrical body 28a having a suction tip 28c at its distal end. A movable piston 28b is received within the cylindrical body 28a, with a piston rod extending from the rear end of the piston 28b to the outside of the cylindrical body 28a. A conventional small-sized syringe, having a capacity of 10 - 15 cc, may be preferably used as the suction means 28. This suction means 28 is inserted into the fluid outlet hole 24d of the pad 24 at its suction tip 28c after a completion of ink refilling into the cartridge 10 and sucks a predetermined amount of ink and/or air from the cartridge 10 by extending the piston 28b from the body 28a rearwardly.

In the preferred embodiment, the suction means 28 is designed to have a syringe shape. However, it should be understood that the shape and construction of the suction means 28 may be freely changed into several shapes and constructions without affecting the function of this

invention if the altered shape and construction of the suction means 28 do not affect the desired function of the means 28. For example, the syringe-type suction means 28 may be changed into a bellows-type suction means or a tubular suction means, each having an injection tip capable of being air-tightly inserted into the fluid outlet hole 24d of the pad 24.

As shown in Fig. 4a, the pad 24 of this device 20 is also provided with a pad cover (a protection cap) 29, which is selectively used for covering the boss 24b of the pad 24 as follows. The object of this cap 29 is to prevent the ink-jet nozzle 10b of the cartridge 10 from being dried or malfunctioning when it is necessary to keep the cartridge 10 removed from a printer for a lengthy period of time. That is, when the cartridge 10 is kept removed from a printer for a lengthy period of time, the cartridge 10 is seated in the case 22 in the same manner as that described for the ink refilling process. After seating the cartridge 10 in the case 22, the cap 29 is fitted over the boss 24b of the pad 24 so as to close the hole 24d of the pad 24 at the outside of the device 20, thus almost completely preventing the ink-jet nozzle 10b of the cartridge 10 from being dried or malfunctioning. In the present invention, the cap 29 may be provided having another shape without affecting the functioning of this invention. That is, the cap 29 of Fig. 4a may be replaced with another cap, comprising a plate body with an insert projection being formed at the center of one surface of plate body and a finger handle at the other surface of the body. In such a case, the insert projection is designed to be fitted into the hole 24d of the pad 24 so as to close the hole 24d.

In order to keep the cartridge 10 in the case 22 while preventing the ink-jet nozzle 10b from being dried or malfunctioning, a pad 240 in accordance with the

second embodiment of the present invention of Fig. 4b, free from a hole 24d different from the pad 24 of Fig. 2, may be provided in addition to the pad 24 of Fig. 2.

5 The above device 20 of this invention will be operated as follows when it is used in an ink refilling process.

10 When it is necessary to refill an empty cartridge 10 with new ink using the device 20, the cartridge 10 is primarily seated in the device 20, consisting of the case 22 and the pad 24, in the same manner as that described above.

15 When the cartridge 10 is completely seated in the case 22 of the device 20, the rectangular pressure ring 24c of the pad 24 is brought into close contact with the edge of the ink-jet nozzle 10b of the cartridge 10, with a desired space formed between the nozzle 10b and the plate 24a of the pad 24 since the central portion of the plate 24a inside the pressure ring 24c is depressed. The ink-jet nozzle 10b is thus free from coming into contact with the pressure ring 24c of the pad 24 or from being damaged by the device 20.

20 After completely seating the cartridge 10 in the device 20, the ink injection tip 26b of the container 26 is inserted into the ink supply hole 10c of the cartridge 10. When the body 26a of the container 26 in the above position is finger-pressurized, ink is injected from the container 26 into the cartridge 10. When the cartridge 10 is completely filled with ink, the ink injection tip 26b of the container 26 is removed from the ink supply hole 10c of the cartridge 10.

30 After the ink injection tip 26b of the container 26 is removed from the ink supply hole 10c of the cartridge 10, the syringe-type suction means 28 is inserted into the fluid outlet hole 24d of the pad 24 at its suction tip 28c. Thereafter, the piston 28b is extended from the

cylindrical body 28a of the suction means 28 rearwardly, thus allowing the space between the fluid outlet hole 24d of the pad 24 and the cylindrical body 28a of the suction means 28 to be vacuumed. Therefore, a predetermined
5 amount of ink and/or air is sucked from the ink cartridge 10 into the cylindrical body 28a of the suction means 28.

The object of such a suction of ink and/or air from the cartridge 10 using the cylindrical body 28a of the suction means 28 is to remove a congelation of ink and/or
10 air from the nozzle 10, thus securing a desired ink passage from the ink-laden sponge to the ink-jet nozzle 10b within the cartridge 10 in addition to cleaning the nozzle 10b. In such a case, it is preferable to set the amount of ink and/or air sucked from the cartridge 10 to
15 about 2 ~ 7 cc. When the amount of ink and/or air sucked from the cartridge 10 is less than 2 cc, a desired nozzle cleaning effect may not be accomplished. On the other hand, when the amount of ink and/or air sucked from the cartridge 10 is greater than 7 cc, this results in a
20 waste of ink.

After the cleaning operation for the ink-jet nozzle 10b of the cartridge 10 is completed, the suction tip 28c of the syringe-type suction means 28 is removed from the fluid outlet hole 24d of the pad 24 prior to removing the
25 cartridge 10 from the case 22 of the device 10.

When it is necessary to keep an ink-jet printer out of use for a lengthy period of time, the cartridge 10 is removed from the printer prior to being kept within the device 20 of this invention. In such a case, the pad 24
30 of this device 20 may be covered with the protection cap 29 at its boss 24b as shown in Fig. 4a, thus preventing the ink-jet nozzle 10b of the cartridge 10 from being dried or malfunctioning while the cartridge 10 is kept within the device 20 for a lengthy period of time. Of
35 course, this object may be accomplished by using the pad

240 in accordance with the second embodiment of the present invention of Fig. 4b, free from a hole 24d, in place of the pad 24 of Fig. 4a.

5 When the cartridge 10 is completely seated in the case 22 of the device 20 as described above, the rectangular pressure ring 24c of the pad 24 is brought into air-tight contact with the edge of the ink-jet nozzle 10b of the cartridge 10, thereby completely isolating the nozzle 10b from the atmosphere. Ink within
10 the nozzle 10b is thus free from being undesirably dried, and so the nozzle 10b is protected from a congelation of ink.

Figs. 6a and 6b are views of a device for refilling ink into ink cartridges in accordance with the second
15 embodiment of this invention. As shown in the drawings, the case 220 of the ink refilling device according to the second embodiment is designed to be enlarged in width so as to be selectively usable with two types of cartridges, or a small-width cartridge 100, such as a mono ink cartridge, and a large-width cartridge 100', such as a
20 color ink cartridge. In addition, the locking hook 220b of the above case 220 is positioned somewhat eccentrically different from the centrally positioned hook 22b of the primary embodiment.

25 In the above case 220, the width of the locking hook 220b is defined from a position around the central axis of the bottom wall of the case 220 to a position around a longitudinal support guide 22d provided around an axial corner of said bottom wall. The above case 220 is thus
30 selectively usable with two types of cartridges, that is, a cartridge 10 having a centrally positioned locking projection 10d as shown in Fig. 1 or a cartridge 100 having an eccentrically positioned locking projection 100e as shown 6a.

35 In order to support a large-width cartridge 100'

within the case 220 or to guide and hold opposite bottom edges of the small-width cartridge 100 within the case 220, two parallel support guides 22d are longitudinally formed on the bottom wall of the case 220. In addition, two parallel supports 22e are formed on the bottom wall of the case 220 at positions inside the two support guides 22d so as to support the bottom of a small-width cartridge 100 on said bottom wall. In such a case, each support guide 22d is higher than each of the supports 22e.

When a small-width cartridge 100, having an eccentrically positioned locking projection 100e, is installed within the case 220 of this embodiment, the cartridge 100 is seated within the case 220 while being supported on the two supports 22e at its bottom and being guided by the two support guides 22d at its opposite bottom corners as shown in Fig. 6a. It is thus possible to stably seat such a small-width cartridge 100 within the case 220 of this embodiment.

On the other hand, a large-width cartridge 100' is supported on the two support guides 22d at its bottom as shown in Fig. 6b. Therefore, such a large-width cartridge 100' is free from being disturbed by the two supports 22e when it is seated within the case 220.

Since the width of the locking hook 220b of the above case 220 is defined from a position around the central axis of the case's bottom wall to a position around one longitudinal support guide 22d of said bottom wall as described above, the case 220 is selectively usable with a cartridge 10 having a centrally positioned locking projection 10d or a cartridge 100 having an eccentrically positioned locking projection 100e.

Figs. 7a and 7b are views of a device for refilling ink into ink cartridges for ink-jet printers in accordance with the third embodiment of this invention.

As shown in the drawings, the case 220 of the ink refilling device according to the third embodiment has two parallel guide rails 22f, which are formed on the interior surface of the end wall of the case 220 at positions around opposite side edges of the cutout 22a. The above guide rails 22f stably guide a pad 24 or 240 when the pad is installed in the cutout 22a of the case 220 upwardly from the bottom of the case 220. It is thus possible for the pad 24 or 240 to be precisely seated at a desired position within the case 220.

When a pad 24 or 240 is fitted into the cutout 22a of the case 220 upwardly from the bottom of the case 220 so as to be seated therein, the two guide rails 22f guide opposite side edges of the plate 24a of the pad 24 or 240. The pad 24 or 240 is thus stably and precisely seated at a desired position within the case 220 without being undesirably distorted.

After the pad 24 or 240 is completely installed within the case 220, a desired cartridge 10 is seated in the case 220 in a way such that the ink-jet nozzle 10b of the cartridge 10 is precisely aligned with the pad 24 or 240. In such a case, the rectangular pressure ring 24c of the pad 24 or 240 is brought into air-tight contact with the edge of the ink-jet nozzle 10b of the cartridge 10, thereby completely isolating the nozzle 10b from the atmosphere.

As described above, the present invention provides a device and method of refilling ink into ink cartridges for ink-jet printers. The device and method of this invention are specifically designed to expel a predetermined amount of ink and/or air from an ink cartridge after refilling ink into the cartridge, thereby securing a desired ink passage in the ink-jet nozzle of the cartridge's print head in addition to cleaning the nozzle. The device and method of this invention thus

finally allow users to easily refill empty cartridges with new ink and accomplish an effective recycling of such ink cartridges. Therefore, the present invention allows the users to reuse empty cartridges while saving money in addition to prevention of environmental pollution and of waste of natural sources.

Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

**WHAT IS CLAIMED IS:**

1. A device for refilling ink into ink cartridges for ink-jet printers, comprising:

- 5 a case designed to seat an empty ink cartridge therein during an ink refilling process, said case having a shape capable of covering a lower portion of said cartridge from a first end of the cartridge having a print head to a second end, with both a cutout being
- 10 partially formed from a bottom wall to a first end wall of the case corresponding to said first end of the cartridge and a locking hook being formed at a second end of said case so as to engage with a locking projection of said cartridge during the ink refilling process; and
- 15 a pad removably and upwardly set in said cutout of the case from the bottom wall of said case so as to be positioned just around an ink-jet nozzle of the cartridge during the ink refilling process, said pad consisting of
- 20 a flat plate, with both a cutout fitting boss integrally formed on a first surface of said plate and a pressure ring formed on a second surface of the plate so as to be brought into air-tight contact with an edge of the ink-jet nozzle when the cartridge is completely seated in the case.

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2. The device according to claim 1, wherein said plate is thoroughly holed at its center inside the pressure ring, thus having a fluid outlet hole passing through the cutout fitting boss.

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3. The device according to claim 1, wherein said case is enlarged in width so as to be selectively usable with two types of cartridges, or small-width cartridges and large-width cartridges, with two parallel support
- 35 guides interiorly and axially formed on the bottom wall



of the case so as to support a large-width cartridge thereon or to guide and hold opposite bottom edges of a small-width cartridge, said case also having two parallel supports on its bottom wall at positions inside the two support guides so as to support the small-width cartridge on said bottom wall.

4. The device according to claim 1, wherein said locking hook of the case is positioned eccentrically, with the width of said locking hook being defined from a position around a central axis of the bottom wall of said case to a position around one of two parallel support guides provided around opposite axial corners of said bottom wall.

5. The device according to claim 1, wherein two parallel guide rails are formed on an interior surface of said first end wall of the case at positions around opposite side edges of said cutout, said guide rails being used for stably guiding said pad when the pad is seated into the cutout of the case.

6. The device according to claim 2, further comprising a protection cap used for selectively and externally covering said cutout fitting boss of the pad.

7. A method of refilling ink into ink cartridges for ink-jet printers using an ink refilling device, comprising the steps of:

seating a pad into a case of said device;
installing an empty cartridge into said case, with an ink-jet nozzle of the cartridge being brought into air-tight contact with said pad of the case;
refilling the cartridge with ink through an ink supply hole of the cartridge; and



- inserting a suction means into a fluid outlet hole of said pad from the outside of said case and sucking a predetermined amount of ink and/or air from said cartridge so as to secure a desired ink passage in the
- 5 ink-jet nozzle of the cartridge in addition to cleaning said nozzle.