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Method of cleaning nozzle surfaces of an inkjet print head assembly

Abstract

A method for cleaning nozzle surfaces of an inkjet print head assembly includes using a cleaning slide to carry out a movement along the assembly and clean the nozzle surfaces with a cleaning liquid in ultrasonic vibration. The cleaning slide includes an ultrasonic cleaning device, a suction device, and a rinsing device and the movement of the cleaning slide includes a forward movement and a backward movement. During the forward movement, the ultrasonic cleaning device and the suction device following the ultrasonic cleaning device are activated while the rinsing device following the two is deactivated. During the backward movement, the rinsing device and the suction device following the rinsing device are activated while the ultrasonic cleaning device following the two is deactivated. Cleaning liquid and contamination are advantageously prevented from reaching the interior of print heads or into an ink supply system thereof, preferably in industrial inkjet printing.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATION

(1) This application claims the priority, under 35 U.S.C. § 119, of European Patent Application EP22188456.2, filed Aug. 3, 2022; the prior application is herewith incorporated by reference in its entirety.

FIELD AND BACKGROUND OF THE INVENTION

(2) The invention relates to a method of cleaning nozzle surfaces of an assembly of inkjet print heads, in which a cleaning slide carries out a movement along the assembly and cleans the nozzle surfaces with a cleaning liquid in ultrasonic vibration.

(3) The technical field of the invention is the field of the graphic industry and in particular the field of industrial, i.e. high-performance, high-quality inkjet printing on flat substrates, i.e. the application of tiny droplets of liquid ink in accordance with an image onto flat substrates such as sheet-shaped, web-shaped, foil-shaped, or label-shaped printing substrates, preferably made of paper, cardboard, plastic, metal, or composite materials. In particular, the field of the invention is the field of cleaning print heads or rather the sensitive nozzle surfaces.

DESCRIPTION OF THE RELATED ART

(4) German Patent Application DE 10 2020 105 736 A1 discloses inkjet print head cleaning by using ultrasound, wherein cleaning fluid caused to vibrate in ultrasonic vibration is applied to the

nozzle surface of a print head of a print bar from a cleaning trough, flows off through a gap between the cleaning trough and the print head, and is collected in a collecting trough. In that process, a relative movement may be generated by moving the print heads along the cleaning trough. In addition, cleaning liquid may be injected and ejected during the cleaning operation, a process known as “purging.”

(5) A problem that may occur in that context, is that cleaning liquid with contamination may get into the print heads.

SUMMARY OF THE INVENTION

(6) It is accordingly an object of the invention to provide a method of cleaning nozzle surfaces of an inkjet print head assembly, which overcomes the hereinafore-mentioned disadvantages of, and provides an improvement over, the heretofore-known methods of this general type, namely an improvement that in particular prevents cleaning liquid with contamination from getting into the interior of print heads or into their ink supply system.

(7) In particular, the intention is to prevent cleaning liquid from entering the nozzles and from thus contaminating the ink because that would create another problem: ink which has been contaminated in that way may not cure correctly or even not cure at all and may need to be exchanged.

(8) With the foregoing and other objects in view there is provided, in accordance with the invention, a cleaning method for cleaning nozzle surfaces of an assembly of inkjet print heads, wherein a cleaning slide carries out a movement along the assembly and cleans the nozzle surfaces with a cleaning liquid caused to vibrate in ultrasonic vibration, the cleaning slide includes an ultrasonic cleaning device, a suction device, and a rinsing device and the movement of the cleaning slide includes a forward movement and a return movement, upon the forward movement, the ultrasonic cleaning device and the suction device following the ultrasonic cleaning device are activated and the rinsing device following the two is deactivated, and upon the return movement, the rinsing device and the suction device following the rinsing device are activated and the ultrasonic cleaning device following the two is deactivated.

Advantageous Embodiments and Effects of the Invention

(9) The respective method of the invention advantageously provides a way of preventing cleaning liquid and contaminants from entering the interior of print heads or into the ink supply system thereof.

(10) Since the invention involves aspirating the cleaning liquid emitted by the ultrasonic cleaning device, it effectively prevents the cleaning liquid and potential contaminants it contains from entering the nozzle openings of the print heads and from reaching the ink supply system and spreading therein. Thus the aspiration is preferably done immediately after the ultrasonic cleaning operation, i.e. at a very short distance in terms of space and thus likewise in terms of time. The spatial distance (between the adjacent walls of the ultrasonic cleaning device and the suction device or between the respective centers of the two devices) preferably ranges between a few millimeters and a few centimeters and is preferably less than 5 cm or less than 3 cm or less than 1 cm. The same applies for the interaction between the suction device and the rinsing device, if provided, and the distances between them.

(11) The “assembly of inkjet print heads” may be referred to as a so-called “print bar.” A print bar preferably extends in a lateral direction across the entire printable width of the printing substrate. In multicolor printing, multiple print bars succeeding one another in the direction of transport of the printing substrate may be provided. The print bars including the print heads are preferably stationary in a lateral direction in an inkjet printing machine. The relative movement for the cleaning operation is preferably created by laterally moving the cleaning slide.

(12) Advantageous and thus preferred further developments of the invention will become apparent from the dependent claims as well as from the description and drawings.

(13) Further Developments of the Invention:

(14) The following paragraphs describe preferred further developments of the invention (in short: further developments).
(15) A further development may be that the activated ultrasonic cleaning device emits the cleaning liquid, in particular in an upward direction.
(16) A further development may be that the emission of the cleaning liquid occurs from a chamber that is open towards the inkjet print heads.
(17) A further development may be that the emission of the cleaning liquid from the chamber occurs in the form of a surge bath.
(18) A further development may be that the emission in the form of a surge bath occurs as an overflow over a wall of the chamber that is leading on the forward movement and over a further wall of the chamber that is trailing on the forward movement. An overflow over side walls may likewise be envisaged.
(19) A further development may be that cleaning liquid that overflows in the surge bath is collected and either removed/discharged or fed back into the chamber. For the purpose of feeding it back, a pump may be provided.
(20) A further development may be that the collection is done in a collection channel extending adjacent to the wall and to the further wall and preferably open in an upward direction.
(21) A further development may be that an activatable and deactivatable ultrasound source is disposed on or in the chamber to cause the cleaning liquid to vibrate in ultrasonic vibration. The ultrasound source is preferably provided on a bottom of the chamber.
(22) A further development may be that the activated rinsing device emits a rinsing liquid, preferably in an upward direction.
(23) A further development may be that the emission of the rinsing liquid occurs from a further chamber—different from the chamber—that is open towards the print heads. The further chamber may be provided as an open channel. The further chamber is preferably smaller than the chamber (in terms of the volume of liquid contained therein). The chamber and the further chamber preferably extend in a transverse/lateral direction across the assembly of print heads or at least in a transverse direction across the nozzle surfaces section that needs to be cleaned.
(24) A further development may be that the cleaning liquid and the rinsing liquid are identical. They may preferably both be supplied from a common reservoir, i.e. only one liquid may be used. For this purpose, one pump or two pumps may be provided.
(25) A further development may be that on the forward movement, the suction device aspirates air, thus also aspirating cleaning liquid and contaminants from the nozzle surfaces.
(26) A further development may be that on the return movement, the suction device aspirates air and/or the rinsing liquid of the rinsing device, thus also aspirating cleaning liquid and contaminants from the nozzle surfaces.
(27) A further development may be that the aspiration occurs through an aspiration channel of the suction device, the aspiration channel formed in the cleaning slide and having a suction opening open towards the inkjet print heads. In a direction transverse to the print head assembly, this channel is preferably at least as long as the chamber and the further chamber.
(28) A further development may be that the aspirated cleaning liquid and/or rinsing liquid is fed to a liquid separator.
(29) A further development may be that the aspirated cleaning liquid and/or rinsing liquid is fed back to the ultrasonic cleaning device or rinsing device through a feedback channel.
(30) A further development may be that the aspirated cleaning liquid and/or rinsing liquid is fed to a waste container.
(31) A further development may be that an adapter for the ultrasonic cleaning device is provided before the first inkjet print head of the assembly and the ultrasonic cleaning device is moved to the adapter to be filled with cleaning liquid, preferably filled completely.
(32) A further development may be that a further adapter is provided after the last inkjet print head

of the assembly and the ultrasonic cleaning device is moved to the further adapter to be emptied of cleaning liquid, preferably emptied completely.
(33) The adapters may preferably be provided as fitting covers for the ultrasonic cleaning device or the chamber thereof.
(34) A further development may be that the cleaning slide is provided on a cleaning drawer movable in a horizontal direction.
(35) A further development may be that the cleaning slide is moved with the cleaning drawer, preferably out of a park position of the drawer.
(36) A further development may be that the cleaning drawer is moved under the assembly of inkjet print heads in a horizontal direction.
(37) A further development may be that a roll table provided for transporting the printing substrate is lowered.
(38) A further development may be that the cleaning drawer is moved into the room created by the lowering.
(39) A further development may be that the cleaning slide is provided as a part of a cleaning box including a trough, the cleaning box provided on the cleaning drawer.
(40) A further development may be that upon a stop between forward and return movements of the cleaning slide, the inkjet print heads emit ink into a trough of the cleaning box (known as “purging”).
(41) A further development may be that multiple cleaning boxes are provided, each having a trough and a cleaning slide movable in a longitudinal direction relative to the box. In this case, preferably all cleaning slides are moved together.
(42) A further development may be that for a simultaneous cleaning of multiple assemblies of inkjet print heads, a corresponding number of cleaning boxes is provided. For instance, four (for CMYK), seven (for CMYK+OGV) or eight (for CMYK+OGV+white) cleaning boxes may be provided for a corresponding number of inks in multicolor printing.
(43) A further development may be that the cleaning slide is spring-mounted against the cleaning box. Thus, the cleaning slide may spring-loaded against the print heads and may slide along the print heads (yet without contacting the nozzle surfaces). In this process, a precise tolerance of +/−0.02 mm may be maintained. In cleaning and rinsing operations, the slide preferably moves at a speed of between 20 and 80 mm/sec on the forward and return movements.
(44) A further development may be that a defined distance is maintained between the ultrasonic cleaning device, the suction device, and the rinsing device on the one hand and the nozzle surfaces on the other hand. This avoids damage to the sensitive nozzle surfaces.
(45) A further development may be that the cleaning drawer is motor-driven. A further development may be that a motor is provided for this purpose.
(46) A further development may be that the cleaning method is implemented in an inkjet printing machine.
(47) A further development may be that in the process, an assembly of inkjet print heads is cleaned by using the one cleaning box.
(48) A further development may be that in the process, multiple parallel assemblies of inkjet print heads may be cleaned by using multiple cleaning slides that are movable in parallel.
(49) A further development may be that the multiple cleaning slides are moved together.
(50) A further development may be that a cleaning drawer with multiple cleaning boxes is moved by a motor in a horizontal direction from a park position that is lateral relative to a direction of transport of a printing substrate and into a cleaning position, in the cleaning position, multiple cleaning slides are jointly moved along a corresponding number of print bars for cleaning purposes in a horizontal forward movement and for rinsing purposes in a horizontal return movement, while an ultrasound source is activated during cleaning, and the cleaning drawer is subsequently returned to the park position.

(51) Any desired combination of the features and combinations of features disclosed in the above sections regarding the technical field, invention, and further developments as well as in the section below regarding exemplary embodiments likewise represents advantageous further developments of the invention.
(52) Other features which are considered as characteristic for the invention are set forth in the appended claims.
(53) Although the invention is illustrated and described herein as embodied in a method of cleaning nozzle surfaces of an inkjet print head assembly, it is nevertheless not intended to be limited to the details shown, since various modifications and structural changes may be made therein without departing from the spirit of the invention and within the scope and range of equivalents of the claims.
(54) The construction and method of operation of the invention, however, together with additional objects and advantages thereof will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

Description

BRIEF DESCRIPTION OF THE FIGURES
(1) FIG. **1** is a diagrammatic, longitudinal-sectional view of a preferred exemplary embodiment of a device for implementing a preferred exemplary embodiment of a cleaning method of the invention;
(2) FIG. **2** is a cross-sectional view of the device; and
(3) FIG. **3** is a perspective view of a printing machine.
DETAILED DESCRIPTION OF THE INVENTION
(4) Referring now in detail to the figures of the drawings, in which corresponding features have the same reference symbols, there is seen an inkjet printing machine **10** for industrial high-quality and high-performance inkjet printing, preferably to print on web-shaped printing substrates such as paper or label material, including at least one assembly **11** (i.e. as a so-called print bar) of multiple inkjet print heads **12** preferably disposed in a row and directed downward and stationary during printing, the assembly **11** being oriented in a transverse direction relative to the printing substrate or rather to the direction of transport thereof). Every print head **12** has a nozzle surface **13** with a plurality of nozzles **14** for emitting ink **15** in the form of tiny individual droplets in a controlled way and in accordance with the information of the image to be printed. These nozzle surfaces are very sensitive and therefore need to be carefully cleaned to remove potential contaminants **16** such as solidified ink **15** and/or dust (e.g. paper dust).
(5) The device preferably includes multiple elongated cleaning boxes **21** disposed to be parallel to one another and preferably to be jointly movable in a horizontal direction parallel to the print bars (i.e. the direction of the longitudinal extension thereof). All boxes **21** may preferably be disposed on a cleaning drawer **20** movable in a horizontal direction and may be moved together with the drawer **20** in a forward direction **71** and a return direction **72**. FIGS. **1** and **2** are sectional views from the side, each figure illustrating an example of a single such box **21**; FIG. **3** illustrates two.
(6) In the aforementioned transverse direction, the drawer **20** is preferably motor-driven to move back and forth between a cleaning position and a park position. During printing, the drawer is retracted and in the park position and the nozzle surfaces are exposed above the printing substrate transported beneath them. Each one of the cleaning boxes **21** includes a trough **22** that is open towards the top to implement a process known as purging the print heads **12**, and a cleaning slide **23** movable back and forth in a direction **70** to clean and rinse the nozzle surfaces **13** and/or the nozzles **14** in an upward direction. FIG. **1** illustrates the slide **23** in a cleaning position **24**, i.e. it is at a short distance below the nozzle surfaces **13**. (When the drawer **20** is in its cleaning position),

the cleaning slide is movable back and forth along the nozzle surfaces. This movement may be motor-driven, for instance by a non-illustrated motor with a belt drive. The forward movement (preferably in the direction of the operating side OS of the machine) is for cleaning purposes, whereas the return (or backward) movement (preferably in the direction of the drive side DS of the machine) is for rinsing purposes after the cleaning. The cleaning slide is preferably positioned and movable at a short distance **25** from the nozzle surface. The gap formed by the distance between the slide and the nozzle surfaces prevents direct contact between them, thus avoiding damage to the nozzle surfaces. In addition, the gap is used to receive liquids for cleaning and/or rinsing.

(7) The cleaning slide **23** includes three devices: an ultrasonic cleaning device **30**, a suction device **40**, and a rinsing device **50**. These devices may be provided in a common block of the slide. The device **30** uses a cleaning liquid **60**; the device **50** uses a rinsing liquid **61**.

(8) FIG. **2** illustrates the same device as in FIG. **1** but with less detail. However, it can be seen that the illustrated print bar **11** has an adapter **17** and a further adapter **18** at the start and at the end of the row of print heads **12**. Each one of the two adapters has adapter surfaces disposed in the same plane as the nozzle surfaces **13**. The adapters may be constructed as aluminum blocks. In this way, the adapters may be used for operations which might put stress on the print heads or contaminate or damage them. The adapters **17**, namely the adapter surface thereof, are used, for instance, to close the device **30** when it is being filled with the cleaning liquid, although a gap between the adapter **17** and the device **30** remains (in a way similar to the gap between print heads **12** and device **30**), whereas the further adapter **18**, namely the adapter surface thereof, is used to control the device **40** or rather the vacuum required in the device **40** for suction purposes. Thus filling and emptying operations are preferably not done near the print head **12** but at the adapters. Once the filling has been completed, an ultrasound source and the suction action are activated (see below) and the cleaning slide **23** passes (preferably once) underneath the nozzle surfaces (cleaning motion; forward movement). Then, an optional purging operation may take place, i.e. the print heads eject ink into the trough **22** to push out cleaning liquid residue that may have entered the print heads. In order to remove ink residue from the print heads, i.e. from the nozzle surfaces thereof, a rinsing movement (return movement) including the introduction of rinsing liquid is carried out (see also below). It is clearly likewise possible to carry out the cleaning movement and the rinsing movement in the respective opposite direction as long as the cleaning operation is done first and the rinsing operation afterwards.

(9) FIGS. **2** and **3**, also illustrate a side wall **19** of the printing machine **10** (on the drive side DS of the machine); the drawer **20** is preferably moved back and forth through an opening **19***a* in the side wall (or parts, e.g. drawer carriers extending in a lateral direction are moved through corresponding openings **19***a*). The park position is preferably behind the side wall (with the print heads and the transport path for the printing substrate in front of the side wall). The movement is preferably motor-driven by a motor **26** which drives the drawer.

(10) FIG. **1** illustrates an activatable ultrasound source **31** disposed on the bottom of a chamber **32** for cleaning liquid **60** to be discharged. The device **30** forms a surge bath **33** with a respective overflow **34** over a leading wall **35** (on the forward movement) and a trailing further wall **36** (on the forward movement). In the cleaning operation, i.e. on the forward movement, the cleaning liquid is caused to vibrate in ultrasonic vibration and contacts the nozzle surfaces **13**, causing them to be cleaned. Excess liquid **60** is fed back to a liquid separator **43** through one or more collection channels **37** and subsequently disposed of in a waste container **45**. This may be achieved solely through gravity of the ink without any pump. The cleaning liquid may be supplied from a reservoir **46** through a supply line. A pump may be used for this purpose.

(11) On the forward movement of the cleaning movement (to the right-hand side in the example of FIG. **1**), it is not only the device **30** for cleaning that is activated but also the trailing device **40** for suction. The device **40** includes a suction channel **41** with a suction opening **42** open towards the top towards the nozzle surfaces **13**. Liquid **60** that was emitted by the device **30** but is not fed back

through the collection channels **37**, for instance because it adheres to the nozzle surface, is aspirated, preferably together with air **62**, by the device **40**. Such aspirated liquid is fed back to the liquid separator **43** through a feedback channel **44** and/or a feedback line **44** and then to the waste container **45** to be disposed of.
(12) The device shown in FIG. **1** further includes the rinsing device **50**, which is activated on the backward movement of the cleaning movement (to the left-hand side in the illustrated example of FIG. **1**) together with the trailing suction device **40**. The device **50** emits a rinsing liquid **61** coming from a further chamber **51**, preferably equipped with a rinsing slant **52** in the direction of the suction device **40**. The rinsing liquid **61** is aspirated, preferably together with air **62**, by the aspiration device **40**. In this process, the aspirated liquid **61**, which contains contaminants, is fed to the liquid separator **43** through the feedback channel **44** to be fed to the waste container **45** and disposed of. The rinsing liquid may be supplied from the reservoir **46** through a supply line. A pump may be used for this purpose. Rinsing liquid and cleaning liquid may preferably be the same liquid. As an alternative to the illustrated embodiment of the rinsing device **50**, which includes the further chamber **51** with the rinsing slant **52**, the rinsing device may include a device for spraying on rinsing liquid **61**, for instance a spray bar with spray nozzles.
(13) FIG. **3** is a perspective view of a printing machine **10**. Machine parts that are not relevant in the context of the invention have been left out for reasons of visibility. The figure shows the side wall **19** with multiple openings **19***a*, the cleaning drawer **20** in the cleaning position **24**, two examples of cleaning boxes **21**, each including a cleaning slide **23**, and an example of a print bar **11** with print heads **12**.
(14) The following is a summary list of reference numerals and the corresponding structure used in the above description of the invention.
LIST OF REFERENCE SYMBOLS
(15) **10** inkjet printing machine **11** assembly/assemblies/print bar **12** inkjet print heads **13** nozzle surfaces **14** nozzles **15** ink **16** contamination **17** adapter **18** further adapter **19** side wall **19***a* openings **20** cleaning drawer **21** cleaning box(es) **22** trough(s) **23** cleaning slide **24** cleaning position(s) **25** distance **26** motor **27** belt **30** ultrasonic cleaning device **31** ultrasound source **32** chamber for cleaning liquid to be emitted **33** surge bath **34** overflow **35** leading wall **36** trailing further wall **37** collection channel/collection line **40** suction device **41** suction channel **42** suction opening **43** liquid separator **44** feedback channel/feedback line **45** waste container **46** reservoir **50** rinsing device **51** further chamber for rinsing liquid to be emitted **52** rinsing slant **60** cleaning liquid **61** rinsing liquid **62** air **70** movement of the cleaning slide **71** forward movement **72** backward movement

Claims

1. A method for cleaning nozzle surfaces of an inkjet print head assembly, the method comprising: providing a cleaning slide including an ultrasonic cleaning device, a suction device, and a rinsing device; using the cleaning slide to carry out a movement along the assembly and clean the nozzle surfaces with a cleaning liquid in ultrasonic vibration; carrying out the movement of the cleaning slide with a forward movement and a backward movement; during the forward movement, activating the ultrasonic cleaning device and activating the suction device following the ultrasonic cleaning device, while keeping the rinsing device deactivated following the two; during the backward movement, activating the rinsing device and activating the suction device following the rinsing device, while deactivating the ultrasonic cleaning device following the two; emitting a rinsing liquid from the activated rinsing device; emitting the cleaning liquid from a chamber; and emitting the rinsing liquid from a different further chamber being open towards inkjet print heads of the inkjet print head assembly.
2. The method according to claim 1, which further comprises emitting the cleaning liquid from the

activated ultrasonic cleaning device.
3. The method according to claim 2, which further comprises emitting the cleaning liquid from a chamber being open towards inkjet print heads of the inkjet print head assembly.
4. The method according to claim 3, which further comprises emitting the cleaning liquid from the chamber as a surge bath.
5. The method according to claim 2, which further comprises during the forward movement, using the suction device to aspirate air and also aspirate the cleaning liquid and contamination off of the nozzle surfaces.
6. A method for cleaning nozzle surfaces of an inkjet print head assembly. the method comprising: providing a cleaning slide including an ultrasonic cleaning device, a suction device, and a rinsing device; using the cleaning slide to carry out a movement along the assembly and clean the nozzle surfaces with a cleaning liquid in ultrasonic vibration; carrying out the movement of the cleaning slide with a forward movement and a backward movement; during the forward movement, activating the ultrasonic cleaning device and activating the suction device following the ultrasonic cleaning device, while keeping the rinsing device deactivated following the two; during the backward movement, activating the rinsing device and activating the suction device following the rinsing device, while deactivating the ultrasonic cleaning device following the two; emitting a rinsing liquid from the activated rinsing device; and during the backward movement, using the suction device to aspirate the rinsing liquid of the rinsing device and also aspirate the cleaning liquid and contamination off of the nozzle surfaces.
7. A method for cleaning nozzle surfaces of an inkjet print head assembly, the method comprising: providing a cleaning slide including an ultrasonic cleaning device, a suction device, and a rinsing device; using the cleaning slide to carry out a movement along the assembly and clean the nozzle surfaces with a cleaning liquid in ultrasonic vibration; carrying out the movement of the cleaning slide with a forward movement and a backward movement; during the forward movement, activating the ultrasonic cleaning device and activating the suction device following the ultrasonic cleaning device, while keeping the rinsing device deactivated following the two; during the backward movement, activating the rinsing device and activating the suction device following the rinsing device, while deactivating the ultrasonic cleaning device following the two; emitting the cleaning liquid from the activated ultrasonic cleaning device; emitting a rinsing liquid from the activated rinsing device; during the forward movement, using the suction device to aspirate air and also aspirate the cleaning liquid and contamination off of the nozzle surfaces; and during the backward movement, using the suction device to aspirate the rinsing liquid of the rinsing device and also aspirate the cleaning liquid and contamination off of the nozzle surfaces.
8. The method according to claim 7, which further comprises carrying out the aspiration through a suction channel of the suction device, the suction channel being formed in the cleaning slide and having a suction opening being open towards inkjet print heads of the inkjet print head assembly.
9. A method for cleaning nozzle surfaces of an inkjet print head assembly, the method comprising: providing a cleaning slide including an ultrasonic cleaning device, a suction device, and a rinsing device; using the cleaning slide to carry out a movement along the assembly and clean the nozzle surfaces with a cleaning liquid in ultrasonic vibration; carrying out the movement of the cleaning slide with a forward movement and a backward movement; during the forward movement, activating the ultrasonic cleaning device and activating the suction device following the ultrasonic cleaning device, while keeping the rinsing device deactivated following the two; during the backward movement, activating the rinsing device and activating the suction device following the rinsing device, while deactivating the ultrasonic cleaning device following the two; and providing an adapter for the ultrasonic cleaning device in front of a first inkjet print head of the inkjet print head assembly, and moving the ultrasonic cleaning device towards the adapter to be filled with the cleaning liquid.
10. The method according to claim 9, which further comprises providing a further adapter for the

ultrasonic cleaning device after a last inkjet print head of the inkjet print head assembly, and moving the ultrasonic cleaning device towards the further adapter to be emptied of the cleaning liquid.

11. A method for cleaning nozzle surfaces of an inkjet print head assembly, the method comprising: providing a cleaning slide including an ultrasonic cleaning device, a suction device, and a rinsing device; using the cleaning slide to carry out a movement along the assembly and clean the nozzle surfaces with a cleaning liquid in ultrasonic vibration; carrying out the movement of the cleaning slide with a forward movement and a backward movement; during the forward movement, activating the ultrasonic cleaning device and activating the suction device following the ultrasonic cleaning device, while keeping the rinsing device deactivated following the two; during the backward movement, activating the rinsing device and activating the suction device following the rinsing device, while deactivating the ultrasonic cleaning device following the two; and placing the cleaning slide on a cleaning drawer being movable in a horizontal direction.

12. The method according to claim 11, which further comprises providing the cleaning slide as a part of a cleaning box, and placing the cleaning box on the cleaning drawer.