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(54) **SELF-CONTAINED INKJET PRINTING MODULE**

(57) The invention relates to a self-contained inkjet printing module containing print heads (5) for printing the required width in a single passage, said heads including a system for the maintenance, pressurisation and thermal conditioning of the ink used. The number of modules required depends on the number of coloured inks used and the desired print resolution. The module also includes a mechanism which covers the injector plate and collects the ink poured during each draining operation, thereby cleaning said injector plates and preventing the ink from drying. The invention takes the form of an inverted metal T-section profile (4) to which the print heads (5) are mounted such that the injector plate (1) is exposed. The metal profile (4) includes two lower horizontal cylindrical perforations (6) which are interconnected so that a heating liquid can flow therethrough. The profile also Includes another upper cylindrical perforation (8) for distributing the ink which travels to the print head (5) through vertical holes (9).

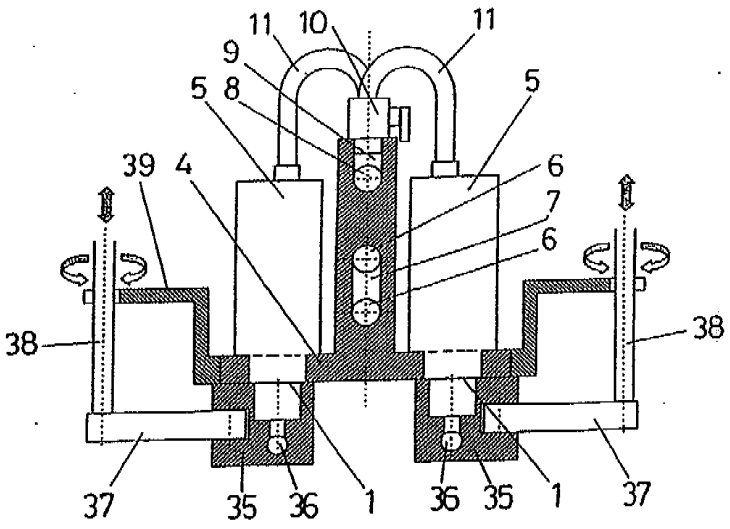

FIG.10

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Description

OBJECT OF THE INVENTION

[0001] As stated in the title of this descriptive specification, the present invention relates to a self-contained inkjet printing module which has been specially conceived for the construction of inkjet printers in which different print heads are assembled until the desired printing width and number of colours is obtained.

[0002] The number of injectors for each head is usually a power of two (one, two, four, eight, sixteen, thirty-two, sixty-four, one hundred and twenty-eight, etc.), being aligned and distributed uniformly in a plane commonly known as the "Injector plate".

[0003] When it is wished to print in each passage a width greater than the separation between the first and last Injectors, one resorts to positioning various heads together in such a way that the required width is covered. Given the fact that, before the first injector and following the last one there exists a useless zone (without injectors) in the Injector plate, the heads cannot be positioned side by side with the injectors aligned and instead one has to resort to a quincunx arrangement or they have to be overlapped in an oblique arrangement, as we will see later on in relation to the figures.

[0004] This arrangement has to be repeated for each of the different inks (colours) used, In such a way that the heads are arranged ordered in different rows.

[0005] Each of the said heads needs a system that will keep the plate, where the injector holes are housed, in an optimum state of cleanliness so that the quality of the printing is not affected.

[0006] These maintenance systems usually perform three basic functions:

- Keeping the injector plate clean.

[0007] During normal functioning of the print heads, splashing of the Ink takes place depending on the injector plate. During the processes of priming and draining, spillages of ink are produced which flood the injector plate. Moreover, the external ambience to which the injector plate is exposed means that it also becomes dirty from dust, threads, etc.

[0008] There are two systems that are mainly used for cleaning: scraping with a spatula and blowing, at all times following a deliberate flooding with fresh ink to avoid erosion of the injector plate.

- Priming of dried injectors.

[0009] Inkjet print heads normally function by keeping the ink at a pressure below ambient, with the ink being maintained in the Injectors by the action of the meniscus formed due to the surface tension of the ink.

[0010] It quite frequently happens that the meniscus of one or more injectors breaks due to sudden mechanical and/or hydraulic oscillations. This causes the affected injector or injectors to suck in air and become dry. In order to restore the broken meniscus, the pressure of the ink is normally made to be greater than the outside, so that a small quantity of ink can flow which fills the entire path as far as reaching the injector hole. Increasing the pressure of the ink and/or reducing the external pressure by means of a vacuum carries out this increase in pressure.

[0011] After carrying the re-priming as described, the injector plate is flooded and has to be cleaned as we have already mentioned in the previous point.

- Preventing the ink from drying.

[0012] During normal functioning of an inkjet print head, the ink flows through the injector holes in such a way that the ink in the injectors is always being renewed and maintains its properties even in the event of containing a highly volatile component, whose evaporation could produce an alteration in its properties. The main problem that can appear is that the evaporation of a volatile component and the consequence increase in the concentration of the other components can cause the viscosity of the ink to increase so much that it blocks up the injectors.

[0013] This is normally prevented by hermetically sealing the zone surrounding the injectors and/or keeping the ink damp.

BACKGROUND OF THE INVENTION

[0014] There exists a large number of patented systems on the market that carry out the functions described above. Most of them have, for each head used, a concave piece made of soft elastomer which is used as a plug to prevent evaporation, for collecting remains of ink and for sucking when it is wished to reduce the pressure in the zone close to the injector plate. These systems also usually include a soft elastomer spatula which is used for removing remains of fresh ink that have become deposited on the injector plate following a draining process with Ink.

[0015] When inkjet printers are constructed for printing large formats in a single passage and/or with numerous inks, the number of heads to install grows to the point where the conventional solutions described above become difficult to construct and handle.

DESCRIPTION OF THE INVENTION

[0016] In general terms, the self-contained inkjet printing module which the invention proposes comprises the inkjet print heads arranged for printing the width that is required in a single passage.

[0017] This module comprises the maintenance system for the installed heads, as well as the pressurisation and thermal conditioning system for the ink used. Since this module includes all the elements related to the con-

ditioning of the heads and the ink that they use, the construction of a machine is limited to the installation of as many self-contained modules as might be needed depending on the number of inks and the desired print resolution.

[0018] The self-contained module proposed by the invention offers a basic structure defined by an extruded or machined metal inverted T-section profile in which are incorporated mounted the print heads, with the injector plate being left exposed via the lower part. This metal T-section profile includes three cylindrical perforations along its entire length, two of which are located in the lower part and are connected to each other to define a circuit which the liquid has to pass through at the temperature it is wished for the printing module to be functioning at, and the other perforation is arranged in the upper part, the three perforations being horizontal and the latter one defining a collector duct or distributor duct and thermal conditioner for the ink, from which there start a series of as many vertical holes as there are heads that are going to be installed, in such a way that manual valves and tubes can be arranged that supply the ink to the print heads at the desired temperature.

[0019] As we will see later on, in order to supply the ink to the print heads at the suitable pressure to each moment (less than that of ambient at the moment of printing, and greater than that of ambient in the case of draining and priming), one of three systems that are listed below can be used:

- In the first system, the ink remains in the working reservoir with a certain level less than that of the injector plates. During the printing phase, the electrovalves for entrance of air under pressure and of ink under pressure remain closed, with the reservoir being linked to the outside, therefore the pressure at which the ink reaches the heads via the distributor depends only on the level of the reservoir.

[0020] As the head uses the ink, It becomes necessary to refill the working reservoir in order to keep the level within the limits set by the manufacturers of the heads. During this refilling operation, the electrovalves for connecting the reservoir with the outside and for the entrance of Ink under pressure remain open, with the one for the entrance of air under pressure being closed, so that the ink thus flows inside the reservoir without affecting the pressure of the ink in the heads.

[0021] When it is required to increase the pressure for draining and priming, the electrovalves for connecting with the outside air and for the entrance of ink under pressure remain closed, and the one for the entrance of air under pressure is opened, so that this pressure can cause the ink to flow through the injector holes.

- In the second system, during the printing phase the electrovalve for the entrance of Ink under pressure remains closed and direct connection is established for the reservoir with the distributor. There exists a peristaltic pump in bypass with the electrovalve inserted in this latter duct that is mentioned, which remains shut off, with the electrovalve closed, in such a way that the pressure of the ink in the heads depends only on the level inside the working reservoir analogously to the previous system.

[0022] During this refilling operation, the electrovalve for the ink under pressure is opened and the ink flows inside the reservoir without affecting the pressure of the ink in the heads due to the fact that the reservoir is connected to the outside.

[0023] When it is required to increase the pressure for draining and priming, the electrovalve in bypass with the pump is closed and the peristaltic pump is started up so that the pressure of the air causes the ink to flow through the injector holes. This system allows the refilling of the working reservoir to be able to be carried out at the same as the draining is being done.

- In the third system, during the printing phase the electrovalve for the entrance of ink under pressure remains closed and a centrifugal pump allows the ink to be impelled from the reservoir towards the distributor, in such a way that the pressure of the ink In the heads depends only on the level inside the working reservoir, with the centrifugal pump being shut off, since the ink flows via the channels of the pump's impeller In the shut off position.

[0024] During this refilling operation, the electrovalve for the ink under pressure is opened so that the ink flows inside the reservoir without affecting the pressure of the ink in the heads due to the fact that the reservoir is connected to the outside.

[0025] When it is required to increase the pressure for draining and priming, the centrifugal pump is started up so that the pressure of the air causes the ink to flow through the injector holes. This system also allows the refilling of the working reservoir to be able to be carried out at the same as the draining is being done.

[0026] The self-contained inkjet printing module furthermore includes a mechanism that is capable of covering the injector plate and being able to collect the ink poured during each draining operation and leave the injector plate as clean as possible In order to be able to print with good quality. This mechanism is also capable of preventing the ink from drying when the module is not functioning.

[0027] The invention provides two solutions for the piece that covers the Injector plate, with one solution or the other being used depending on the ink:

- In the first solution, the print head is protected by some flaps which leave just a small groove visible for the injectors. Inserted between the plate and the flaps is a lamina of absorbent sponge having the

function of collecting the drops of ink that splash onto the injector plate. In this way the period of time between cleanings is extended.

[0028] By means of a concave cover housed in its cavity, another absorbent sponge collects the surplus ink. During the cleaning process, this cover takes on the closed position and after the draining the surplus ink is sucked through a lower duct existing in that cover. The air that is sucked through the slits in the vicinity of the cover dries the absorbent lamina.

[0029] In the second solution, the injector plate is left entirely exposed and it is the concave cover which houses separate absorbent sponges at the ends of its cavity, which collect the surplus ink and clean a movable spatula at the end of each travel, as we will see later on in relation to the figures.

[0030] The movement of the covers for taking up the working and rest positions Is achieved with the combined movement of displacement and rotation of some vertical shafts to which are attached different cranks linked to those covers.

[0031] In order to facilitate an understanding of the characteristics of the Invention, and forming an Integral part of this specification, it is accompanied by some sheets of plans containing figures in which, on an illustrative rather than limiting basis, the following has been represented:

BRIEF DESCRIPTION OF THE DRAWINGS

[0032]

Figure 1a.- Shows the schematic arrangement of the inkjet print heads, for the printing in a single passage of the width that is required, according to a configuration in which the print width is increased maintaining the original resolution of the head.

Figure 1b.- Is a schematic view similar to that of figure 1a, according to a configuration in which the print width and the print resolution have been increased (by a factor equal to 1/sin α).

Figure 2a.- Shows the structure of the heads of figure 1a, repeated for each of the different inks (colours) used, ordered in different rows.

Figure 2b.- Shows a view similar to that of figure 2a, in which the heads are repeated for each of the different inks.

Figure 3.- Is a schematic view in transverse cross-section of the basic structure of the self-contained inkjet printing module, in accordance with the invention.

Figure 4.- Is a diagram of a first system of supply of ink to the print heads, in accordance with the Invention.

Figure 5.- Is a diagram of a second system of supply of ink to the print heads, in accordance with the invention.

Figure 6.- Is a diagram of a third system of supply of ink to the print heads, in accordance with the invention.

Figure 7.- Shows in two positions a) and b) the print head and its closing cover in exploded view and pressed against the head, respectively, in accordance with a first solution.

Figure 8.- Is a view similar to that of figure 7, in accordance with a second solution.

Figure 9.- Is a schematic view in longitudinal cross-section of that shown in figure 8.

Figure 10.- Is a schematic view In longitudinal cross-section similar to figure 3 but including the protection and cleaning covers for the heads, along with their actuation system, in the rest position.

Figure 11.- Shows in three positions a), b) and c) the sequence of movements for passing from the rest/cleaning phase of figure 10 to that of work or printing.

DESCRIPTION OF THE PREFERRED FORM OF EMBODIMENT

[0033] Making reference to the numbering adopted in the figures, and especially in relation to figures 1a and 1b, it can be seen schematically different injector plates 1 arranged in two different ways for printing in each passage a width greater than that occupied by the injectors, with some overlapping zones being left in such a way that the injectors 2 can perform a uniform sweeping. In figure 1a, the original resolution is maintained and in figure 1b the resolution is increased since the lines of sweeping are closer to each other, specifically according to a factor corresponding to 1/sin α.

[0034] In figures 2a and 2b, the repetition of these same structures of figures 1a and 1b can be seen for each of the colors of ink used, four in the case shown.

[0035] In figure 3 can be seen the basic structure of the printing module, referenced in general with the number 3 and materialized by the extruded or machined metal inverted T-section profile 4, provided with windows for fitting the print heads 5 with their injector plates 1.

[0036] Reference 6 designates two of the three horizontal longitudinal perforations, the lowest ones, which are connected together with the step 7 at one end, for the circulation of liquid at the desired temperature. The remaining perforation, referenced with 8 and covered by the other end, acts as a distributor and is traversed by the ink at the temperature of the block, exiting via vertical ducts 9 to the respective print heads 5 passing through the valves 10 and tubes 11.

[0037] With special reference to figure 4, the ink is supplied to the heads 5 at the correct pressure, from the reservoir 12 in which the level is kept at a certain height 13 with respect to the injector plates 1, arriving at the distributor 8. The reference 14 designates the entrance of air at a pressure controlled by the electrovalve 15 and the reference 16 is the entrance of Ink under pressure

when the electrovalve 17 is open. During the printing phase, the electrovalves 15 and 17 are closed and the electrovalve 18 is open, which connects to the outside line 19. The pressure with which the ink arrives at the heads via the distributor depends solely on the level In the reservoir 12.

[0038] In order to refill the reservoir 12 and keep its level within the limits specified by the manufacturer of the heads, the electrovalves 18 and 17 remain open during the refilling operation and 15 is closed so that the ink flows inside the reservoir without affecting the pressure of the ink in the heads. For the draining and priming, the electrovalves 18 and 17 remain closed and 15 is open.

[0039] In the second system, schematically represented in figure 5, ink under pressure arrives at the reservoir 12 from the duct 16 via the electrovalve 17. The electrovalve 20 is fitted in bypass with the peristaltic pump 21. During the printing phase the electrovalve 17 remains closed, the electrovalve 2 is open and the peristaltic pump 21 is shut off. The pressure of the ink in the heads depends solely on the level inside the working reservoir 12.

[0040] During the refilling operation, the electrovalve 17 is open so that the ink can flow inside the reservoir without affecting the pressure of the ink in the heads due to the connection duct 19 for the reservoir with the atmosphere.

[0041] When the pressure is increased in order to carry out the draining and priming, the electrovalve 20 is closed and the peristaltic pump 21 is started up, with the ink flowing through the injector orifices.

[0042] In relation to figure 6 where the third system of supplying ink to the print heads is shown, the electrovalve 17 remains closed and the centrifugal pump 22 is shut off, in such a way that the pressure of the ink in the heads depends only on the level 13 inside the working reservoir 12. In this system, the ink flows via the ducts of the impeller of the centrifugal pump which is shut off.

[0043] For the refilling, the electrovalve 17 is opened so that the ink flows inside the reservoir 12 since it is connected to the outside via the duct 19.

[0044] When it is required to increase the pressure in order to carry out draining and priming, the centrifugal pump 22 is started up. This system also allows refilling simultaneous with draining.

[0045] In figure 7, positions a) and b), the print head 5 can be seen protected by the flaps 23 leaving just the small groove 24 exposed. Between the lower face of the injector plate 1 and the flaps 23 is arranged the absorbent sponge 25.

[0046] The reference 26 designates the concave cover with another absorbent sponge 27 which collects the surplus ink. During the cleaning process, the cover 26 moves to position b) of figure 7 and after the draining the surplus ink is sucked up via the duct 28, and at the same time the air is sucked through the slits 29 dries the absorbent lamina 25. The mound 30 formed when the sponge 27 presses on the groove 24 helps to eliminate drops from the injector plate 1.

[0047] In the second solution, according to that shown squematically in figures 8 and 9, the injector plate is entirely exposed due to the print head 5 being mounted on the window made in the support or profile 4.

[0048] Now, the concave cover 26 has two absorbent sponges 31 housed in the ends of its cavity, which are for collecting the surplus ink, and also for cleaning the spatula referenced with 32 at the end of each travel. During the cleaning process, the cover goes to its position and following the draining the surplus ink is sucked through the duct 28. The spatula 32 then collects the drops remaining on the injector plate in a longitudinal movement, depositing them on the sponges 31 at the end. As can be seen, the spatula 32 can oscillate freely on the cylinder 33 in which it is fitted, this cylinder being integral with the rod 34 in such a way that when the latter moves, the spatula can tilt (rotating on the cylinder 33) in order to be able to slide more smoothly on the injector plate.

[0049] Having described the typologies of the cover that covers the injector plate, we are now going to see how it is installed In the printing module and how these pieces move from the rest and cleaning position to the printing position. In figure 10 it can be seen that the heads 5 are fitted on the inverted T-section profile 4 in two parallel rows. The covers must therefore also have this configuration of two parallel rows.

[0050] In the diagram of figure 10 the covers of each row are made of a single piece in the form of bars and are referenced with number 35. They include a longitudinal duct 36 which links the outlets for ink from each one.

[0051] Each of the bars 35 is joined to several cranks 37 perpendicular to separate vertical shafts 38 which have the possibility of rotating, rising and falling. The different cranks 37 cause the rotation of the shafts 38 to become converted into a parallel displacement of the bars 35. This figure 10 shows the system in a rest/cleaning position in which all the actions aimed at priming the injectors and cleaning the injector pate will be carried out.

[0052] In order to pass from the rest/cleaning position to the working position, the following sequence of movements is carried out as shown in figure 11 in three positions a), b) and c).

[0053] The vertical shafts 38 rotate in the supports 39 and slide downwards starting from the position shown in figure 10, as shown In position a) of figure 11.

[0054] Next, the vertical shafts 38 rotate through 90° displacing the bars 35 in parallel which adopt the position shown in figure position b).

[0055] When the vertical shafts 38 slide upwards as shown in position c), the working position is acquired.

Claims

1. **SELF-CONTAINED INKJET PRINTING MODULE**, comprising print heads for printing the required width in a single passage, and a maintenance system for

the installed print heads, along with a pressurisation and thermal conditioning system for the ink used, there existing as many modules as are necessary depending on the number of inks and the desired print resolution, further comprising a mechanism capable of covering an injector plate and collecting the ink poured during each draining operation, leaving said injector plate as clean as possible, moreover preventing the Ink from drying out when the module is not functioning, **characterised in that** it comprises an extruded or machined metal inverted T-section profile (4) on which the print heads (5) are mounted, with the injector plate (1) being left exposed via the lower part, provision having been made for the said metal profile (4) to include,along the entire length of its core, three horizontal cylindrical perforations (6, 8), the lowest ones being linked together via one end by means of a duct (7) defining a circuit for the circulation of liquid at the desired temperature, while the upper one (8) takes on functions of distributor and thermal conditioning of the ink entering through one end and passing through to the print heads (5) via vertical ducts (9) made in the upper part and by means of respective manual valves (10) and tubes (11).

2. **SELF-CONTAINED INKJET PRINTING MODULE,** according to claim 1, **characterised in that** the ink is supplied to the print heads (5) with the right pressure at each moment, by means of a working reservoir (12) with a level lower than the injector plates (1), having electrovalves (15, 17) for the entrance of air under pressure (15) and of ink under pressure (17) which are closed and an electrovalve (18) that links with the outside which is open during the printing phase; the working reservoir (12) being filled in order to maintain the level as the ink is consumed, with the electrovalves for the entrance of ink under pressure (17) and the electrovalve (18) for connection with the outside remaining open.

3. **SELF-CONTAINED INKJET PRINTING MODULE,** according to claim 1, **characterised in that** during the printing phase the Ink is supplied to the print heads (5) via a distributor (8), by means of a working reservoir (12) with a level lower than the injector plates (1), having an electrovalve (17) for the entrance of ink under pressure to the reservoir (12) which is closed and an electrovalve (20) for linking In bypass with a peristaltic pump (21) for feeding the distributor (8) from the reservoir (12) which is open, said peristaltic pump (21) being shut off; the working reservoir (12) being filled in order to maintain the level due to the electrovalve (17) for the entrance of ink under pressure being open and the reservoir (12) being linked to the outside by means of a duct (19).

4. **SELF-CONTAINED INKJET PRINTING MODULE,** according to claim 1, **characterised in that** during the printing phase the ink is supplied to the print heads (5) via a distributor (8), by means of a working reservoir (12) with a level lower than the injector plates (1), having an electrovalve (17) for the entrance of ink under pressure to the reservoir (12) which is closed and a centrifugal pump (22) for feeding the distributor (8) which is shut off, the ink flowing via channels of the impeller thereof; the working reservoir (12) being filled in order to maintain the level by opening the electrovalve (17) for the entrance of ink and the reservoir (12) being linked to the outside by means of a duct (19).

5. **SELF-CONTAINED INKJET PRINTING MODULE,** according to claim 1, **characterised in that** the print head (5) is protected by some flaps (23) which leave the injectors visible via a small groove (24) and there existing a lamina of absorbent sponge (25) between the injector plate (1) and said flaps (23), further including a movable concave cover (26) with another absorbent sponge (27) which collects the surplus ink, this surplus ink being sucked through a hole (28) in its base, the absorbent sponge (27) forming a mound (30) which closes and helps in cleaning the injectors.

6. **SELF-CONTAINED INKJET PRINTING MODULE,** according to claim 1, **characterised in that** the print head (5) leaves the injector plate (1) exposed due to its positioning in a window made in the metal support or profile (4), further including a concave movable cover (26) with two absorbent sponges (31) at the ends of its cavity, which collect the surplus ink and clean a spatula (32) at the end of each travel.

7. SELF-CONTAINED INKJET PRINTING MODULE, according to claim 6, **characterised in that** the spatula (32) is freely oscillating in a cylinder (33) perpendicularly integral to a longitudinal rod (34) so that when the latter moves axially the spatula tilt and slide more smoothly on the injector plate (1).

8. **SELF-CONTAINED INKJET PRINTING MODULE,** according to claim 1, **characterised in that** concave covers (26) are arranged in two parallel rows beneath the wings of the inverted T-section profile (4), in a single piece or lateral bar (35), with a longitudinal duct (36) as collector for all the ink outlets, both bars (35) being attached to various cranks (37) parallel to each other and connected to separate vertical shafts (38) able to perform a rotary and axial movement, for the parallel displacement of both bars (35) from the rest position as far as the working position and vice versa.

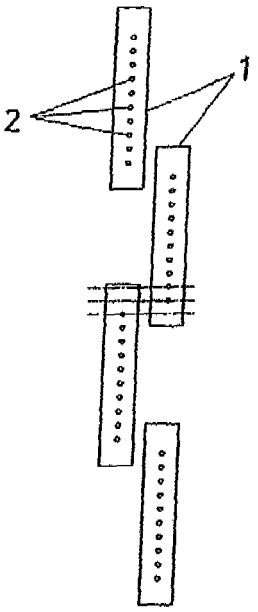


FIG.1a

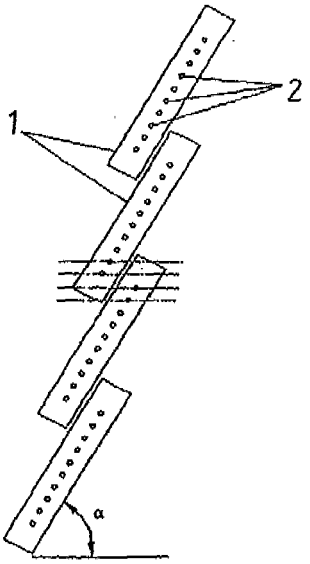


FIG.1b

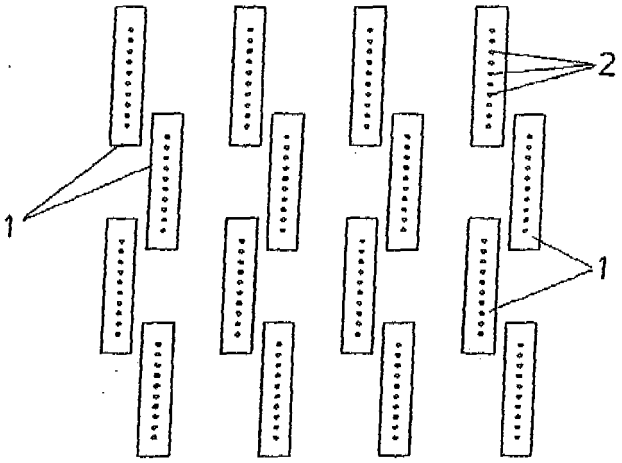


FIG.2a

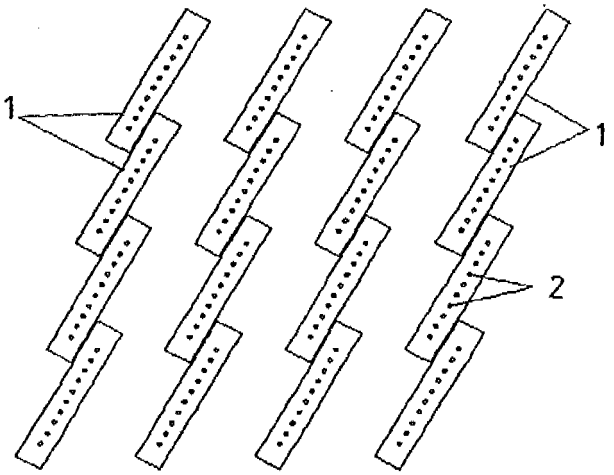


FIG.2b

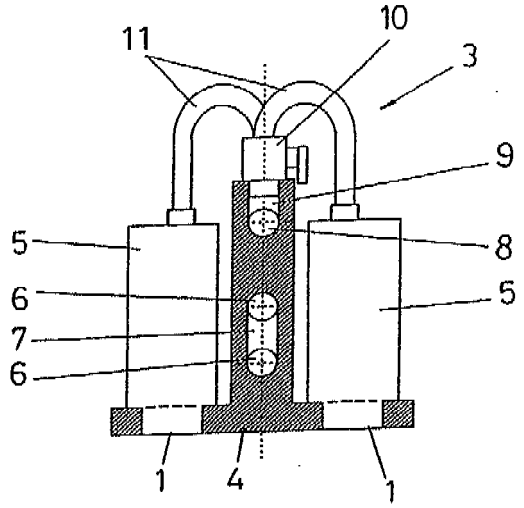


FIG.3

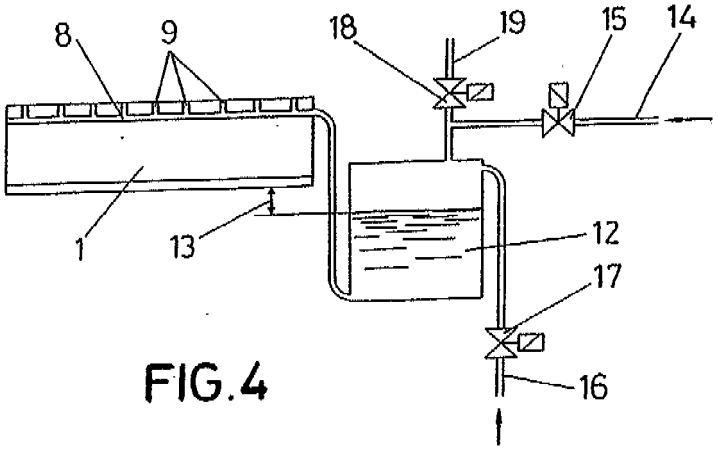


FIG.4

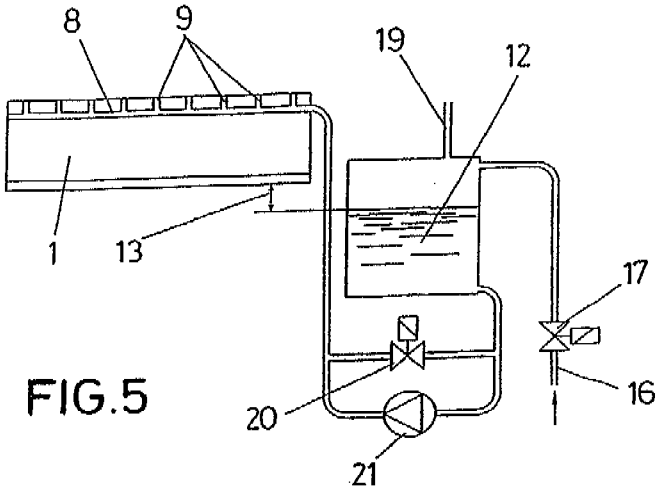


FIG.5

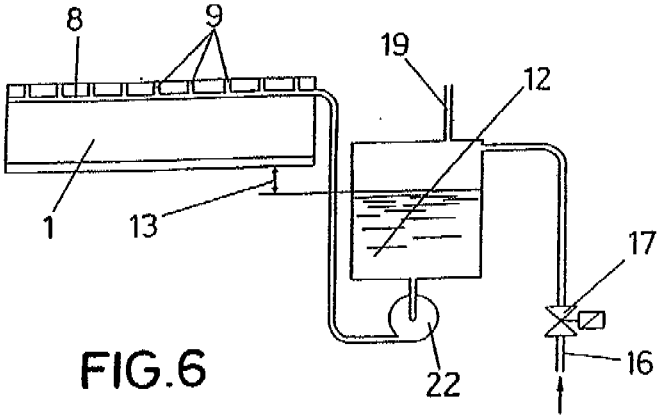
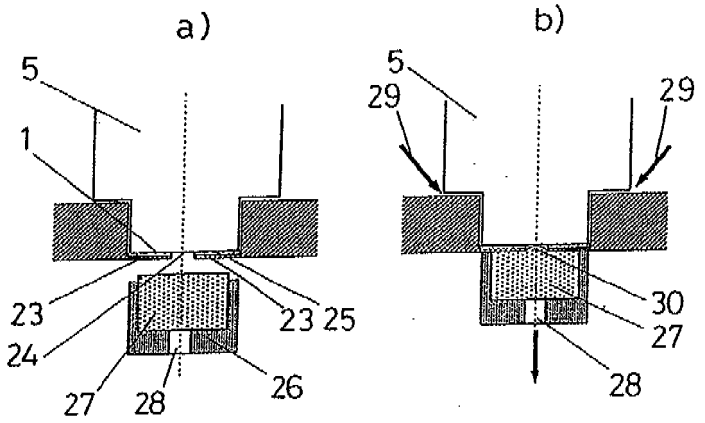


FIG.6


a)
b)
5
1
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23 25
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28

FIG.7

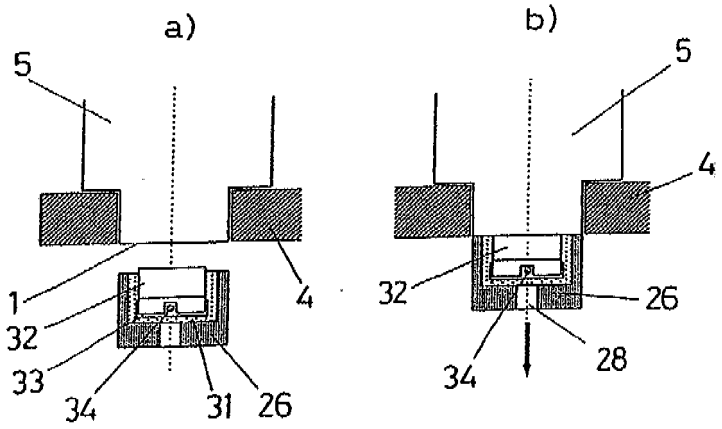
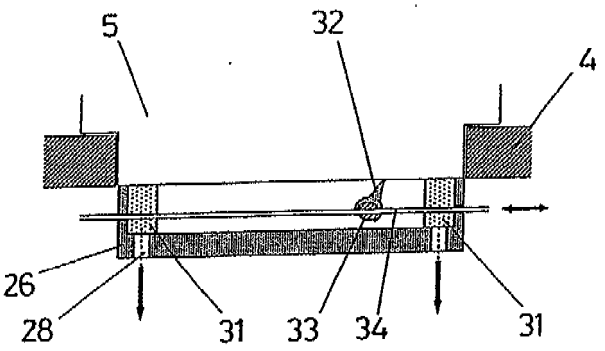

a)
b)
5
1
32
33
34
31
26
4
5
4
32
26
34
28

FIG.8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4
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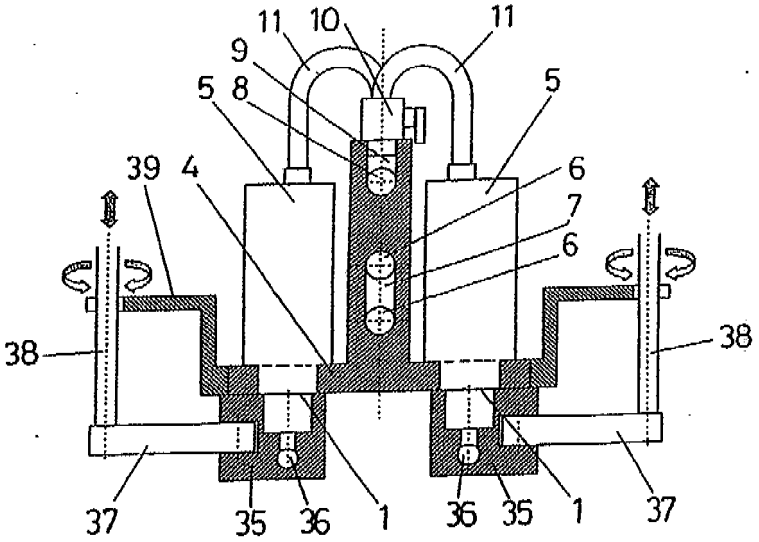
28
31
33
34
31

FIG.9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7
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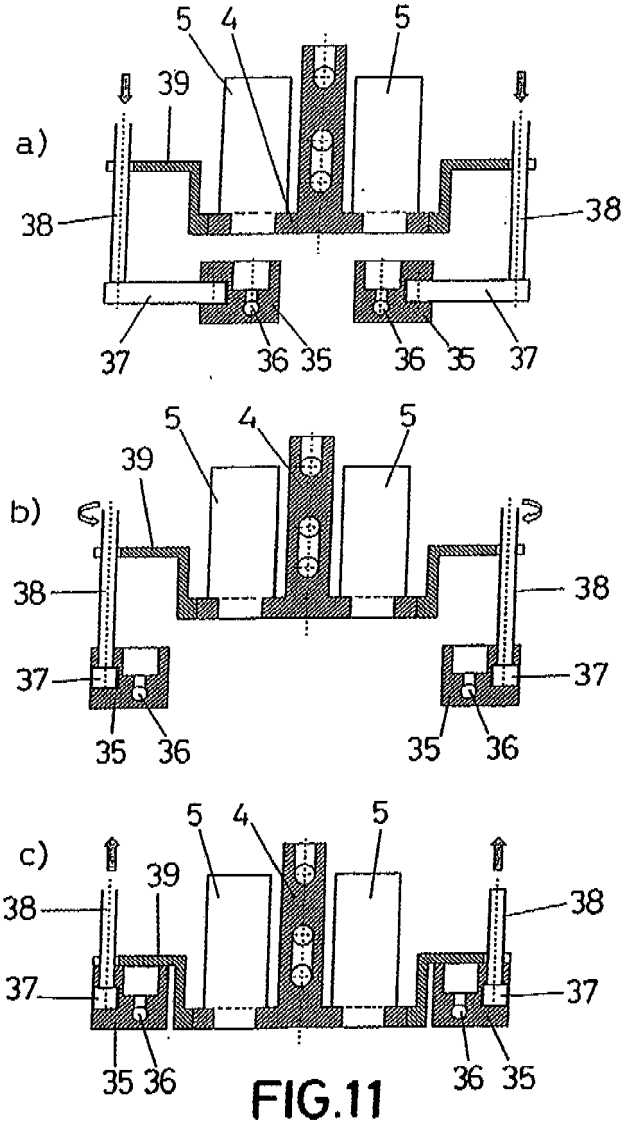
36
1
36
35
1
37

FIG.10


a)
5
4
5
39
38
38
37
36
35
36
35
37
b)
5
4
5
39
38
38
37
37
35
36
35
36
c)
5
4
5
39
38
38
37
37
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36
36
35

FIG.11

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ ES 2007/000680

A. CLASSIFICATION OF SUBJECT MATTER

B41J 2/155 (2006.01)
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B41J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CIBEPAT,EPODOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0512799 A2 (XEROX CORP) 11.11.1992, column 4, lines 1-12;column 7, line 25 - column 9, line 12; and figures.	1-8
A	US 6135586 A (MCCLELLAND et al.) 24.10.2000, the whole document.	1-8
A	US 5057854 A (POND et al.) 15.10.1991, column 6, line 45 - column 8, line 66;	1-8
A	EP 0652107 A2 (OLIVETTI-CANON INDUSTRIALE S.P.A.) 10.05.1995, the whole document.	1-8
A	EP 0430692 A1 (XEROX CORP) 05.06.1991, the whole document.	1-8

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 April 2008 (21.04.2008)	(25/04/2008)
Name and mailing address of the ISA/ O.E.P.M. Paseo de la Castellana, 75 28071 Madrid, España. Facsimile No. 34 91 3495304	Authorized officer L. Sanz Tejedor Telephone No. +34 913 498 533

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/ ES 2007/000680

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