

Description

Background of the Invention

This invention relates to printheads for ink jet printing apparatus, and more particularly to a printhead of this class having a plurality of jet orifices arranged in a matrix for discharging droplets of ink to print data on a surface moving past the printhead.

In certain respects, the invention involves improvements on the printhead disclosed in US-A-4,723,131.

Reference may also be made to US-A-4,792,817 for a disclosure of a printhead on which, in certain respects, the invention of US-A-4,723,131 is an improvement, and on which the present invention may be regarded as involving improvements.

Reference may also be made, as in US-A-4,723,131, to US-A-4,215,350, US-A-4,378,564, US-A-4,542,386, US-A-4,450,375, US-A-4,555,719 and US-A-4,576,111 for their disclosures of printheads of this class.

While the printhead disclosed in US-A-4,723,131 has been quite satisfactory for many purposes, including as stated therein the printing of relatively small characters (e.g., alphanumeric characters), it has been found that spacing of its orifices cannot be reduced for printing even smaller characters such as may be desired, the reduction of the spacing of the orifices being limited in the case of the use (as has been found desirable) of the heads or pistons designated 202 in US-A-4,723,131 by the diameter required for these members. Thus, for example, it has been found impractical to space the orifices any closer than 0.050" (1.27mm), characters printed with this spacing being of the order of 5/16" (7.94mm) high. Also, the printhead disclosed in US-A-4,723,131 includes an insert (designated 52 in US-A-4,723,131) which has been found not only to add to the cost of the printhead (including assembly cost) but also adversely to affect the consistency of the printing in some instances. Further, consideration was given to utilizing the principles of the printhead disclosed in US-A-4,723,131 for printing bar codes, but it was found difficult to obtain sufficient flow of ink for such printing.

Summary of the Invention

Among the several objects of this invention may be noted the provision of an improved printhead for ink jet printing apparatus of the type having a membrane such as shown in US-A-4,723,131 eliminating the insert of the latter thereby simplifying the construction and assembly of the

printhead; the provision of an improved construction for such a printhead enabling closer spacing of the orifices of the printhead for printing even smaller characters, e.g., of the order of 5/32" (3.97mm) high, attaining improved flow rates of ink and improved stabilization of the size of the dots of ink which are printed on the target surface; the provision of an improved construction for such a printhead enabling ink jet printing of bar codes on target surfaces moving past the printhead; and the provision of means for minimizing problems which might otherwise be incurred on start-up of the printhead after a period during which the printhead has been out of use (e.g., overnight) due for example to drying of ink in and thereby clogging the orifices of the printhead.

In general, with regard to that phase of the invention involving elimination of the insert of the printhead disclosed in US-A-4,723,131, the improved printhead of this invention comprises a body having a front face and a back face, a chamber therein for ink under pressure, a port extending from the chamber to the back face of the body, a recess in the back face adjacent but spaced from the end of the port at the back face constituting the back end of the port, and a passage extending forward from the recess through the body to the front face of the body. The end of this passage at the front face constitutes an orifice for delivery of ink onto a target surface moving relative to the body past its front face. A flexible membrane on said back face is engageable therewith all around the back end of said port and said recess. Means is provided for releasably holding the membrane pressed against the back face of the body around said port to block flow of ink from said chamber out of the back end of said port, this holding means being operable to release the membrane for flexing away from the back end of the port for delivery of ink from said chamber through the back end of the port and thence via said recess to and through said passage.

With regard to that phase of the invention directed to printing of smaller characters, the improved printhead of this invention has a plurality of said ports and a plurality of said recesses, one for each port, said ports being spaced at intervals, each recess comprising an elongate groove extending in a direction away from the port having a first end adjacent but spaced from the back end of the port and a second end spaced from said first end, each of said grooves converging from said ports with their said second ends closer together than the ports and said passages extending through the body from the grooves adjacent their said second ends to the front face of the body for closer spacing of the passages than the ports.

With regard to that phase of the invention directed to printing bar codes, the improved printhead of this invention has a plurality of said passages extending forward from the recess through the body to the front face of the body.

Other objects and features will be in part apparent and in part pointed out hereinafter.

Brief Description of the Drawings

Fig. 1 is a perspective enlarged from actual size of a printhead of this invention particularly for printing small characters, viewed from the front thereof and showing seven orifices of the printhead arranged in one set of four and one of three;

Fig. 2 is a view in elevation of the back of the Fig. 1 printhead with wires for the heads or pistons of the printhead broken away;

Fig. 3 is a transverse (horizontal) section generally on line 3--3 of Fig. 1, a head or piston of the printhead at the right being shown in its closed position and the head or piston at the left being shown in its open position;

Fig. 4 is a vertical section generally on line 4--4 of Figs. 1 and 3;

Fig. 5 is a view on line 5--5 of Fig. 3 of the back face of a front plate of the Fig. 1 printhead;

Fig. 5A is an enlarged fragment of Fig. 5 partly broken away and shown in section;

Fig. 6 is a view on line 6--6 of Fig. 3 of the front face of a back plate of the Fig. 1 printhead, and showing a membrane of the printhead;

Fig. 7 is a view similar to Fig. 6 with the membrane removed;

Figs. 8 and 9 are transverse sections generally on lines 8--8 and 9--9 of Fig. 4;

Fig. 10 is a front elevation of a printhead of this invention for printing bar codes;

Fig. 11 is a view showing a bar code as printed by a printhead such as shown in Fig. 10;

Fig. 12 is a view in elevation of the back of the printhead shown in Fig. 10;

Fig. 13 is a transverse (horizontal) section generally in line 13--13 of Fig. 10;

Fig. 14 is a view on line 14--14 of Fig. 13 of the back face of the front plate of the printhead shown in Fig. 10, with parts broken away and shown in section;

Fig. 14A is an enlarged fragment of Fig. 14;

Fig. 14B is a view in section generally on line 14B--14B of Fig. 14 and Fig. 14A;

Fig. 15 is a view on line 15--15 of Fig. 13 of the front face of the back plate of the printhead shown in Fig. 10 showing in phantom the location of the membrane of the printhead;

Fig. 16 is a transverse (horizontal) section on each of lines 16--16 of Fig. 12;

Fig. 17 is a view similar to Fig. 10 showing a modification thereof;

Fig. 18 is a front elevation of a cover plate which may be used with the printheads of Figs. 1, 10 and 17;

Fig. 19 is a section generally on line 19--19 of Fig. 18;

Fig. 20 is a section generally on line 20--20 of Fig. 19; and

Fig. 21 is a view showing modification of the cover plate of Figs. 18-20.

Corresponding reference characters indicate corresponding parts throughout several views of the drawings.

Detailed Description

Referring first to Figs. 1-9 a printhead 1 of this invention particularly for printing small characters, e.g., letters and numbers approximately 0.156" (3.96mm) high, is shown to comprise an assembly of a body 3 constituted by a first rectangular plate, denoted as the front plate of the printhead, a second rectangular plate 5 denoted as the back plate of the printhead, and a flexible membrane 7 between the two plates. The plates may be made of any material capable of being accurately machined, and are preferably made of a graphite-containing composition. The front and back faces of the front plate 3 are designated 3F and 3B. The front face of the back plate 5 is generally designated 5F and its back face is designated 5B. The long side edges of the plates are designated 3R, 3L and 5R, 5L, respectively, R referring to the right and L to the left as viewed from the front face of the front plate 3 in the usual vertical disposition of the printhead for printing, for example, on cartons being moved past the front face 3F of the printhead by a conveyor (not shown). The short edges of the plates are designated 3t, 3b and 5t, 5b, respectively, t referring to the top and b to the bottom in the usual vertical disposition of the printhead.

The body or front plate 3 has two recesses or grooves 9 and 11, denoted as the upper groove and lower groove respectively, extending transversely of the plate in its back face 3B. Each groove has an intermediate relatively shallow portion denoted 9a for the groove 9 and 11a for the groove 11, and relatively deep ends denoted 9b for the groove 9 and 11b for the groove 11. Two holes 13 and 15 are drilled into the front plate 3 from its bottom edge 3b, intersecting the deep ends of groove 11 and terminating at the deep ends of groove 9. These holes extend parallel to the side edges 3L and 3R, hole 13 being adjacent the left-hand edge 3L and hole 15 being adjacent the right-hand edge 3R. The ends of the holes at the bottom edge 3b of the plate 3 are plugged as indicated at

17.

In the assembly of plates 3 and 5, each of the holes 13 and 15 serves as a chamber for ink under pressure. As herein illustrated, four relatively small diameter holes A1-A4 are drilled in the plate 3 from its back face 3B to the left-hand hole or chamber 13, and three small diameter holes A5-A7 are drilled in the plate 3 from its back face to the left-hand hole or chamber 15. Thus, each hole extends from the respective chamber 13, 15 to the back face 3B of the plate 3 to serve as a port for flow of ink from the chamber back to the back face of the plate. The four ports A1-A4 at the left, constituting a first set of ports, are spaced along the length of the hole or chamber 13 preferably with ports A1 and A4 on a line L1 (see Fig. 5A) adjacent the vertical plane tangent to the inside of the hole or chamber 13 and ports A2 and A3 on a line L2 spaced outward from line L1 (and spaced slightly outward from the vertical central plane of hole 13).

By way of example, port A2 is spaced from port A1 a distance of 0.096" (2.44mm) port A3 is spaced from port A2 a distance of 0.100" (2.54mm) and port A4 is spaced from port A3 a distance of 0.096" (2.44mm), these distances being measured along the length of the hole or chamber 13, i.e., measured vertically. The three ports A5-A7 at the right, constituting a second set of ports; are spaced along the length of the hole or chamber 15 preferably with ports A5 and A7 on a line L3 (again see Fig. 5A) spaced slightly inward of the vertical central plane of hole 15 and port A6 spaced slightly outward of this plane. By way of example, port A6 is spaced from port A5 and port A7 is spaced from port A6 a distance of 0.100" (2.54mm) measured along the length of the hole or chamber 15, i.e., measured vertically. The port A6 (which is the central port of the set of three ports A5-A7) is drilled on a horizontal line L4 which extends transversely of the plate 3 midway between ports A2 and A3 of the set of four ports A1-A4.

For each of the ports A1-A7, an elongate narrow recess is provided in the back face of the plate 3 adjacent but spaced from the end of the port at the back face 3B of plate 3 constituting the back end of the port. These recesses are respectively designated B1-B7, B1 being the recess associated with port A1, B2 with A2, etc. Each of these recesses comprises an elongate relatively narrow groove or channel extending generally radially outwardly with respect to its respective port, having a first end 19 adjacent but spaced from the back end of the respective port and a second end 21 radially outward of the back end of the respective port.

Passages C1-C7 extend forward from the grooves or channels B1-B7, respectively, through the body or plate 3 to the front face 3F thereof. These passages are drilled through the plate with a

short reduced-diameter section at the end of each passage at the front face 3F of the plate 3 constituting an orifice for delivery of ink onto the target surface (e.g., a surface of a carton) moving relative to the plate 3 past its front face. These orifices are respectively designated 01-07 (see particularly Fig. 1). As shown in Figs. 3, 5 and 5A, each of passages C1-C7 extends from adjacent the radially outer end 21 of the respective groove or channel B1-B7 to the front face 3F of the plate 3.

The grooves or channels B1-B4 extend from ports A1-A4 toward the right as viewed from the front and the left as viewed from the back, converging from said ports with their ends 21 closer together than the ports A1-A4, for closer spacing of the passages C1-C4 and the respective orifices 01-07 than the ports A1-A4. The grooves or channels B5-B7 extend from ports A5-A7 toward the left as viewed from the front and the right as viewed from the back, converging from said ports with their ends 21 closer together than ports A5-A7, for closer spacing of the passages C5-C7 and the respective orifices 05-07 than the ports A5-A7.

The membrane 7 is constituted by a generally rectangular piece of relatively thin flexible elastomeric sheet material, e.g., rubber sheet 0.015" (0.38mm) thick. Its width is somewhat greater than the length of the grooves 9 and 11 and its length is greater than the distance between the upper edge of the upper groove 9 and the lower edge of the lower groove 11. It has slots 25 therein registrable with the grooves 9 and 11. The back plate 5 has a recess 27 in its front face for receiving the membrane, the recess having an outline slightly larger than that of the membrane so that the membrane fits in the recess with a minimum of space between the edges of the membrane and the bounding wall in the recess (see Fig. 6). Within the bounds of the recess 27, the back plate 5 has raised areas 29 a-d (see particularly Figs. 3 and 7), these areas being within the bounding wall of the recess so that there is a space 31 all around the raised areas. Each of the latter has a flat front face 33 which is spaced from the bottom of the recess 27 a distance less than the overall depth of the recess 27 so that the plane of the flat front face 33 of each raised area is slightly rearward of the plane of the back face 5B of the back plate 5.

The raised areas 29 a and 29 b within the recess 27 of the back plate 5 have upper and lower transverse grooves 35 and 37, respectively, which in the assembly are located directly behind the upper and lower grooves 9 and 11 in the back face 3B of the front plate 3. A hole 39 is drilled in the back plate from its back face to the groove 35 and a hole 41 is drilled in the back plate from its back face to the groove 37. Fittings such as indicated at 43 and 45 are threaded in the holes 39 and 41,

respectively.

Associated with each of the seven ports A1-A7 is a means indicated generally at 47 for releasably holding the membrane 7 pressed against the back face 3B of the front plate 3 around the back end of the port (i.e., the end of the port at the back face 3B) to block the flow of ink from the respective hole or chamber 13, 15 out of the back end of the port. Each said means 47 comprises a member 49 which may be referred to as a head or piston or plunger slidable in a hole 51 extending through the back plate 5 from its back face 5B to its front face 5F on one end of a wire 53, the other end of the wire being connected to the plunger of a solenoid indicated at 55 (see Fig. 4). A spring washer (not shown) constituting an internal component of the solenoid biases the solenoid plunger and the wire in the direction toward the membrane for pressing of the membrane by the respective head or piston 49 against the back face 3B of the front plate 3 around the back end of the respective port (A1-A7). The solenoid, when energized, pulls the wire against the bias of the spring washer to pull the head 49 away from the membrane 7 to unblock the port and allow flow of ink out of its back end, and thence via the respective groove B1-B7 to the back end of the respective passage C1-C7. The back plate 5' has recesses D1-D7, one for each of the ports, in its front face (the front face of raised area 29) generally in register with the grooves B1-B7 in the back face 3B of the front plate 3 and extending from the holes 51 permitting the flexing of the portion of the membrane which surrounds or spans the back end of the port away from the back face 3B of the front plate 3 to unblock the back end of the port and allow flow of ink from the back end of the port to and through the respective groove.

The front plate 3 and back plate 5, with the membrane 7 therebetween in the recess 27, are held in assembly by screws 59 extending through holes 61 in the front plate and holes 63 in the back plate and threaded in tapped holes in a mounting member (not shown). Accurate registration of the plates is attained by means of pins 65 received in holes as indicated at 67 in the plates. The back plate 5 holds the membrane 7 in sealed relation against the back face 3B of the front plate 3 except at the inner ends of the holes 51 and the recesses D1-D7 where the membrane is permitted to flex away from the back face 3B of the front plate 3.

As diagrammatically illustrated in Fig. 9, conduit (tubing) 69 which is connected to fitting 45 (for ink) extends to the fitting 45 from a quick-disconnect coupling 71 for connection and disconnection of a supply of ink under pressure, the coupling having a member 73 attached to the upstream end of the conduit and a quick connect and disconnect member 75 at the end of a conduit 77 extending

from the supply of ink under pressure (not shown). The coupling 71 is of a type such that when member 75 is disconnected from member 73, these members are closed, and when member 75 is connected to member 73, these members are open for supplying ink to conduit 69.

As diagrammatically illustrated in Fig. 8, conduit 79 which is connected to fitting 43 extends from the fitting 43 to a quick-disconnect coupling 81 similar to coupling 71, the coupling having a member 83 attached to the upstream end of the conduit and a quick connect and disconnect member 85 at the end of a conduit 87 extending from the supply of ink under pressure (not shown). When member 85 is disconnected from member 83, these members are closed, and when member 85 is connected to member 83, these members are open.

Generally, the printhead 1 will be mounted in a housing or casing such as that indicated at 46 in US-A-4,723,131 with the wires 53 and solenoids 55 for the heads or pistons 49 therein, the housing or casing being mounted with the printhead 1 vertically disposed in position for printing, for example, on cartons being moved past the front face 3F of the printhead by a conveyor (not shown). For printing characters, e.g., numerals, letters and graphics on the cartons, line 77 is connected by means of coupling 71 to line 69 for delivery of ink under pressure from the supply (not shown) to the ink chambers 13 and 15 in the front plate 3 of the printhead. Delivery is from the back of the back plate 5 via the fitting 45, and the passaging constituted by hole 41 and groove 37 in the back plate, the lower slot 25 in the membrane 7, and groove 11 in the back face of the front plate 3. Coupling member 85 is disconnected from member 83 to hold ink under pressure in the ink chambers. Operation of the solenoids 55 is under control of a controller (not shown), generally in the same manner as described for the solenoids in US-A-4,723,131. To print a character the controller sends the appropriate signal to the appropriate solenoids 55 for momentary activation thereof. Each solenoid, so momentarily activated, momentarily pulls the respective wire 53 to pull back the respective head or piston 49 away from the membrane 7 as shown for the head or piston for port A2 at the left in Fig. 3. This allows the membrane momentarily to flex back away from sealing engagement with the back face 3B of the front plate 3 around the back end of the respective port A1-A7 for momentarily unblocking the back end of the port, with resultant pressurisation of ink in the respective groove or channel B1-B7 and passages C1-C7 and squirting of a droplet of ink out of the respective orifice 01-07. The flexing back of the membrane from the back end of the respective port A1-A7 is permitted by

the respective recess D1-D7 in the front face 5F of the back plate 5, as shown for the port A2 at the left in Fig. 3 (the head or piston 49 for this port being shown in its pulled-back retracted position in Fig. 3).

It will be observed that the construction of printhead 1 is such as to enable elimination of the insert indicated at 52 in US-A-4,723,131. Also, the arrangement with each of ports A1-A7 relatively widely spaced from the adjacent port, with the grooves or channels B1-B7 extending radially and converging from the ports with their ends 21 closer together than the ports, and with passages C1-C7 extending from the ends 21 of the grooves to the front face 3F of the front plate 3 enables relatively close spacing of orifices 01-07 for small character printing while enabling use of heads or pistons 49 of practical diameter.

The printhead 1 may be flushed out with a solvent by connecting a conduit from a source of solvent under pressure (instead of a source of ink under pressure) to the coupling member 73 and connecting a conduit for draining off the solvent to the coupling member 83. In this way, solvent can be made to flow through the printhead for flushing it out. The flow of solvent is from fitting 45 via hole 41, groove 37, the lower slot 25 in the membrane 7, groove 11, holes 13 and 15, groove 9, the upper slot 25 in the membrane, groove 35 and hole 39 to the fitting 43.

Figs. 10 and 12-16 illustrate a modification of the printhead 1 shown in Figs. 1-9 particularly for printing bar codes such as the bar code shown in Fig. 11 generally designated 91 on cartons being moved past the front face of the printhead by a conveyor (not shown). The bar code comprises a series of what may be referred to as vertical symbol bars such as indicated at 93 and vertical start and stop characters 95 and 97 at the ends of the series of the vertical symbol bars, enclosed within what may be referred to as a bearer bar of relatively long narrow rectangular outline generally designated 99. The bearer bar has top and bottom relatively long horizontal portions 99t and 99b and vertical end portions 99e. The latter may be at times omitted. As printed on a carton being moved past the printhead, the bar code 91 extends horizontally on one side of the carton, the bar 99t being at the top and the bar 99b being at the bottom.

The bar code printhead of Figs. 10 and 12-16, designated 101 in its entirety to distinguish it from the printhead 1, is similar to the printhead 1 in comprising a body or front plate 103, a back plate 105 and a membrane 107 between the two plates. Two holes 113 and 115 (corresponding to holes 13 and 15) are drilled through the plate 103 from its bottom edge 103b to its top edge 103t, extending

parallel to the side edges 103R and 103L of the plate. Holes 116 are drilled in the plate from its back face 103B to the holes 113 and 115 adjacent both ends of holes 113 and 115, and both ends of the holes 113 and 115 are plugged as indicated at 117 outward of the holes 116.

In the assembly of plates 103 and 105, each of the holes 113 and 115 (like each of holes 13 and 15) serves as a chamber for ink under pressure. As illustrated herein, five relatively small diameter holes AA1-AA5 are drilled in the plate 103 from its back face to the hole or chamber 113, and four relatively small diameter holes AA6-AA9 are drilled in the plate 103 from its back face to the hole or chamber 115. Each of these holes (like the holes A1-A7) serves as a port for flow of ink from the respective chamber back to the back face 103B of the plate 103. The five ports AA1-AA5, which are at the left as viewed from the front, are spaced along the length of the hole or chamber 113 all in line, and the four ports AA6-AA9, which are at the right as viewed from the front, are spaced along the length of the hole or chamber 115, being staggered with respect to ports AA1-AA5. By way of example, ports AA2-AA4 are spaced 0.368" (9.35mm), ports AA6-AA9 are also spaced 0.368" (9.35mm), port AA1 being 0.170" (4.32mm) above the level of port AA6, ports AA2-AA4 being at levels halfway between the levels of ports A6-A9, and port AA5 being 0.170" (4.32mm) below the level of port AA9.

For each of the ports AA1-AA9 a recess is provided in the back face of plate 103 adjacent but spaced from the end of the port at the back face of plate 103 constituting the back end of the port, these recesses being respectively designated BB1-BB9, BB1 being the recess associated with port AA1, BB2 with AA2, etc. (see Figs. 13 and 14). Each of these recesses comprises a groove or channel in the back face of plate 103 extending in heightwise direction with respect to the printhead adjacent but spaced from the back end of the respective port on the inside of the back end of the respective port, each port being located generally midway of the level of the ends of the respective recess. The outside 119 of each recess BB1-BB9 (the side toward the respective port) is bowed somewhat outward toward the port (see particularly Fig. 14A).

Each of the recesses or channels BB1-BB9 serves, in effect, as a manifold for feeding ink received from the back end of the respective port AA1-AA9 to a plurality of passages which extend forward from the bottom of the recess or channel through the body or plate 103 to the front face thereof. The passages for the groove BB1 are each designated CC1, those for the groove BB2 are each designated CC2, etc. As shown, there are eight passages for each of grooves BB2-BB4 and

BB6-BB9, seven passages for each of grooves BB5 and BB1. Each passage is drilled through the plate with a short reduced-diameter section at the end of each passage at the front face of the plate 103 constituting an orifice for delivery of ink onto the target surface. The orifices are respectively designated 001-009 (see particularly Fig. 10). As to each of the recesses BB1-BB9, the passages CC1-CC9 (their back ends) are relatively closely spaced along the length of the recess, i.e., heightwise with respect to the printhead. The five recesses BB1-BB5 associated with ports AA1-AA5 are staggered with respect to the four recesses BB6-BB9 associated with ports AA6-AA9. The uppermost passage of each set of passages CC6-CC9 is at a level just below the level of the lowermost passage of the set CC1-CC5 thereabove, i.e., the uppermost passage CC6 is just below the level of the lowermost passage CC1, the uppermost passage CC7 is just below the level of the lowermost passage CC2, etc.

Referring particularly to Fig. 10, it will be observed that there are five sets of orifices 001-005, all these orifices being on a vertical line LL adjacent and on the left of the vertical center line CL of the printhead (as viewed from the front of the printhead), and four sets of orifices 006-009 all on a vertical line RL adjacent and on the right of the vertical center line. There are seven orifices 001 in the 001 set, seven orifices 005 in the 005 set, and eight in each of the other sets. Sets 001 and 005, which are the upper and lower sets on the left, are for printing the top and bottom bearer bars 99t and 99b of the bar code. The length of each of these sets, i.e., the distance between the upper and lower orifice of each set, corresponds to the desired width W for the top and bottom bearer bars. The spacing of the sets 001 and 005 corresponds to the desired spacing S for the top and bottom bearer bars. The sets 002-004 and 006-009 are for printing the vertical symbol bars 93, the vertical start and stop characters 95 and 97 and the end bearer bars 99e. Sets 001-005 are spaced vertically with respect to the front plate 103 of the printhead 101. Sets 006-009 are similarly spaced vertically but are in staggered relation to sets 001-005, lying opposite the spaces between the sets 001-005 so that sets 006, 002, 007, 003, 008, 004, and 009 (eight orifices in each set) are capable of printing complete uninterrupted lines for the vertical symbol bars 93, the vertical start and stop characters 95 and 97 and the end bearer bars 99e.

Like the membrane 7, the membrane 107 is constituted by a generally rectangular piece of relatively thin flexible elastomeric sheet material, e.g., a rubber sheet, with holes such as indicated at 125 which align with the aforesaid holes 116 in the front plate 103. The membrane is disposed in a recess

127 in the front face of the back plate 105, which has raised areas 129 (corresponding to raised areas 29a-d). The back plate 105 has holes such as indicated at 130 which register with holes 125 in the membrane 107 and with the holes 116 in the front plate 103, fittings 131 (like fittings 43, 45) being threaded in holes 130 for connection of lines for supplying ink under pressure to the holes or chambers 113 and 115 or flushing lines in a manner similar to that described for the printhead 1.

Associated with each of the nine ports AA1-AA9 is a means indicated generally at 147 for releasably holding the membrane 107 pressed against the back face of the front plate 103 around the back end of the port to block the flow of ink from the respective hole or chamber 113, 115 out of the back end of the port. Each said means 147 corresponds to the aforesaid means 47, and hence will not be re-described. The back plate 105 has recesses DD1-DD9, one for each of the ports AA1-AA9, each generally in register with the respective port and the respective recess BB1-BB9 permitting the flexing of the portion of the membrane 107 which spans the back end of the port and the respective recess away from the back face of the front plate 103 to unblock the back end of the port and allow flow of ink from the back end of the port to the respective recess BB1-BB9 and thence through the respective passages CC1-CC9 leading from the recess. The plates 103, 105 and the membrane 107 are held in assembly with the membrane sandwiched between the plates by means of screws 159 corresponding to screws 59 of the printhead 1.

In similar manner to that above described for the printhead 1, the bar code printhead 101 will be mounted in a housing or casing such as that indicated at 46 in US-A-4,723,131 along with the wires 53 and solenoids 55 for the heads or pistons 49 of the means 147, the housing being mounted with the printhead 101 vertically disposed in position for printing bar codes such as the bar code 91 illustrated in Fig. 11 extending horizontally on cartons being moved past the front face 103F of the printhead by a conveyor (not shown). Ink under pressure is supplied via the lower fittings 131, for example, to the ink chambers 113 and 115, the upper fittings 131 being ink being held under pressure in the two chambers in the same manner as in the Figs. 1-9 embodiment. Operation of the solenoids for the printhead 101 is under control of a controller (not shown) which functions to send appropriate signals to the appropriate solenoids for momentary actuation thereof to pull back the respective heads or pistons 49 of the respective means 147. This allows the membrane 107 to flex back away from sealing engagement with the back face of the front plate 103 around the back end of

the respective port AA1-AA9 for momentarily unblocking the back end of the port with resultant pressurization of ink in the respective recess BB1-BB9 and passages CC1-CC9 and squirting of droplets of ink out of the orifices 001-009 of the respective set. The flexing back of the membrane 107 from the back end of the respective port AA1-AA9 is permitted by the respective recess DD1-DD9 in the front face of the back plate 105.

For printing the top and bottom bearer bars 99t and 99b, the solenoids for controlling the sets of orifices 001 and 005 are rapidly repetitively actuated for the period of time it takes the carton to move from the point where the bars 99t and 99b are to start (their leading ends) to the point where they are to end (their trailing ends). For printing the relatively wide end bearer bars 99e, relatively wide start and stop characters at 95 and 97 and relatively wide vertical symbol bars 93, the solenoids for controlling the sets of orifices 002-008 are rapidly repetitively actuated for the period of time it takes the carton to move through the desired width for the bar or character. It will also be readily understood that with cartons traveling, for example, from left to right as viewed in Fig. 10, the discharge of droplets of ink from orifices 006-009 is timed in accordance with the rate of travel of the carton so that the discharge from orifices 006-009 completes a bar or character as initiated by the discharge from orifices 001-005.

Fig. 17 illustrates a modification of the embodiment of Figs. 10 and 12-16 for printing bar codes wherein the sets of orifices 001 and 005 for printing the top and bottom bearer bars 99t and 99b are again arranged on line LL but the sets of orifices 002-004, instead of being arranged on line LL along with the sets 001 and 005, are arranged on line RL in line with the sets 006-009, with set 002 between sets 006 and 007, set 003 between sets 007 and 008, and set 004 between sets 008 and 009. It will be understood that the ports AA1-9, the recesses BB1-BB9, the passages CC1-CC9 and the recesses DD1-DD9 are appropriately arranged for the stated disposition of the sets of orifices 001 and 005 on line LL and sets 006, 002, 007, 003, 008, 004 and 009 on line RL.

Figs. 18-20 illustrate a means applicable to any of the above-described embodiments for inhibiting drying out of ink in and resultant clogging of the orifices (01-09, 001-009) during extended periods (e.g., overnight) when the printhead is out of use. This means comprises a rectangular cover plate 151 the height and width of which correspond to the height and width of the front plate of the printhead. This cover plate has a recess 153 in one face 155 thereof, with a groove 157 around the recess in said one face bounding the orifices. A gasket 159 of suitable elastomeric material, e.g., a

suitable rubber, is inset in this groove. The gasket in its uncompressed state, is slightly thicker than the depth of the groove and thus projects beyond the face 155 of the cover plate. The latter is provided with holes 160 for accepting screws 161 for securing it on the outside face of the front plate of the printhead with the gasket compressed all around its margin and thereby in sealing engagement with the front face of the front plate to seal off the recess 153, so that the recess may be filled with an ink solvent via a hole 162 at the top of the plate 151 and its solvent held in the recess at the front of the orifices.

Fig. 21 illustrates a modification of the cover plate of Figs. 18-20 with a shallow recess 163 receiving a membrane 165, the latter being inset in the recess. The membrane in its uncompressed state is slightly thicker than the depth of the recess. When the cover plate is secured on the outside face of the front plate of the printhead, the membrane is compressed and seals the orifices. It may be coated with an ink solvent.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Claims

1. A printhead (1; 101) for ink jet printing apparatus comprising:
 - a body (3; 103) having a front face (3F; 103F) and a back face (3B; 103B);
 - a chamber (13, 15; 113, 115) in the body (3; 103) for ink under pressure;
 - a port (A1-A7; AA1-AA9) extending from the chamber (13, 15; 113, 115) to the back of the body (3; 103);
 - a passage (C1-C7; CC1-CC9) extending forward through the body (3; 103) to the front face (3F; 103F) of the body (3; 103), the end of said passage (C1-C7; CC1-CC9) at said front face (3F; 103F) constituting an orifice (O1-O7; OO1-OO9) for delivery of ink onto a target surface moving relative to the body (3; 103) past its front face (3F; 103F)
 - a flexible membrane (7; 107) at the back of said body (3; 103) for controlling flow of ink to and through said passage (C1-C7; CC1-CC9); and
 - means (47; 147) for releasably holding the membrane (7; 107) pressed against the back end of said port (A1-A7; AA1-AA9) to block



the respective port AA1-AA9 for momentarily unblocking the back end of the port with resultant pressurization of ink in the respective recess BB1-BB9 and passages CC1-CC9 and squirting of droplets of ink out of the orifices 001-009 of the respective set. The flexing back of the membrane 107 from the back end of the respective port AA1-AA9 is permitted by the respective recess DD1-DD9 in the front face of the back plate 105.

For printing the top and bottom bearer bars 99t and 99b, the solenoids for controlling the sets of orifices 001 and 005 are rapidly repetitively actuated for the period of time it takes the carton to move from the point where the bars 99t and 99b are to start (their leading ends) to the point where they are to end (their trailing ends). For printing the relatively wide end bearer bars 99e, relatively wide start and stop characters at 95 and 97 and relatively wide vertical symbol bars 93, the solenoids for controlling the sets of orifices 002-008 are rapidly repetitively actuated for the period of time it takes the carton to move through the desired width for the bar or character. It will also be readily understood that with cartons traveling, for example, from left to right as viewed in Fig. 10, the discharge of droplets of ink from orifices 006-009 is timed in accordance with the rate of travel of the carton so that the discharge from orifices 006-009 completes a bar or character as initiated by the discharge from orifices 001-005.

Fig. 17 illustrates a modification of the embodiment of Figs. 10 and 12-16 for printing bar codes wherein the sets of orifices 001 and 005 for printing the top and bottom bearer bars 99t and 99b are again arranged on line LL but the sets of orifices 002-004, instead of being arranged on line LL along with the sets 001 and 005, are arranged on line RL in line with the sets 006-009, with set 002 between sets 006 and 007, set 003 between sets 007 and 008, and set 004 between sets 008 and 009. It will be understood that the ports AA1-9, the recesses BB1-BB9, the passages CC1-CC9 and the recesses DD1-DD9 are appropriately arranged for the stated disposition of the sets of orifices 001 and 005 on line LL and sets 006, 002, 007, 003, 008, 004 and 009 on line RL.

Figs. 18-20 illustrate a means applicable to any of the above-described embodiments for inhibiting drying out of ink in and resultant clogging of the orifices (01-09, 001-009) during extended periods (e.g., overnight) when the printhead is out of use. This means comprises a rectangular cover plate 151 the height and width of which correspond to the height and width of the front plate of the printhead. This cover plate has a recess 153 in one face 155 thereof, with a groove 157 around the recess in said one face bounding the orifices. A gasket 159 of suitable elastomeric material, e.g., a

suitable rubber, is inset in this groove. The gasket in its uncompressed state, is slightly thicker than the depth of the groove and thus projects beyond the face 155 of the cover plate. The latter is provided with holes 160 for accepting screws 161 for securing it on the outside face of the front plate of the printhead with the gasket compressed all around its margin and thereby in sealing engagement with the front face of the front plate to seal off the recess 153, so that the recess may be filled with an ink solvent via a hole 162 at the top of the plate 151 and its solvent held in the recess at the front of the orifices.

Fig. 21 illustrates a modification of the cover plate of Figs. 18-20 with a shallow recess 163 receiving a membrane 165, the latter being inset in the recess. The membrane in its uncompressed state is slightly thicker than the depth of the recess. When the cover plate is secured on the outside face of the front plate of the printhead, the membrane is compressed and seals the orifices. It may be coated with an ink solvent.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Claims

1. A printhead (1; 101) for ink jet printing apparatus comprising:
 - a body (3; 103) having a front face (3F; 103F) and a back face (3B; 103B);
 - a chamber (13, 15; 113, 115) in the body (3; 103) for ink under pressure;
 - a port (A1-A7; AA1-AA9) extending from the chamber (13, 15; 113, 115) to the back of the body (3; 103);
 - a passage (C1-C7; CC1-CC9) extending forward through the body (3; 103) to the front face (3F; 103F) of the body (3; 103), the end of said passage (C1-C7; CC1-CC9) at said front face (3F; 103F) constituting an orifice (O1-O7; OO1-OO9) for delivery of ink onto a target surface moving relative to the body (3; 103) past its front face (3F; 103F)
 - a flexible membrane (7; 107) at the back of said body (3; 103) for controlling flow of ink to and through said passage (C1-C7; CC1-CC9); and
 - means (47; 147) for releasably holding the membrane (7; 107) pressed against the back end of said port (A1-A7; AA1-AA9) to block



flow of ink from said chamber (13, 15; 113, 115) out of the back end of said port (A1-A7; AA1-AA9), said holding means (47; 147) being operable to release the membrane (7; 107) for flexing away from the back end of the port (A1-A7; AA1-AA9) for delivery of ink from said chamber (13, 15; 113, 115) through the back end of the port (A1-A7; AA1-AA9) and thence to and through said passage (C1-C7; CC1-CC9);

characterised in that the port (A1-A7; AA1-AA9) extends from the chamber (13, 15; 113, 115) to the back face (3B; 103B) of the body (3; 103);

that a recess (B1-B7; BB1-BB9) is formed in the back face (3B; 103B) of the body (3; 103) adjacent but spaced from the end of the port (A1-A7; AA1-AA9) at the back face (3B; 103B) constituting the back end of the port (A1-A7; AA1-AA9);

that the passage (C1-C7; CC1-CC9) extends forward from the recess (B1-B7; BB1-BB9) to the orifice (O1-O7; OO1-OO9) at the front face (3F; 103F) of the body (3; 103);

that the flexible membrane (7; 107) engages with the back face (3B; 103B) of the body (3; 103) all around said recess (B1-B7; BB1-BB9), as well as around the back end of said port (A1-A7; AA1-AA9); and

that the holding means (47; 147) is operable to release the membrane (7; 107) for flexing away from the back end of the port (A1-A7; AA1-AA9) for delivery of ink from said chamber (13, 15; 113, 115) through the back end of the port (A1-A7; AA1-AA9) and thence via said recess (B1-B7; BB1-BB9) to and through said passage (C1-C7; CC1-CC9).

2. A printhead according to claim 1, characterised in that the body (3; 103) comprises a plate constituting a front plate of the printhead (1; 101) and that the membrane (7; 107) is held against the back face (3B; 103B) of said front plate (3; 103) by a back plate (5; 105), said back plate (5; 105) having a front face (5F; 105F) engaging the membrane (7; 107), a back face (5B; 105B) and a hole (51) for said holding means (47; 147) extending therethrough from its back face (5B; 105B) to its front face (5F; 105F) in line with said port (A1-A7; AA1-AA9), said back plate (5; 105) further having a recess (D1-D7; DD1-DD9) in its front face (5F; 105F) generally in register with the recess (B1-B7; BB1-BB9) in the back face (3B; 103B) of said front plate (3; 103) and extending from said hole (51), said hole (51) and said recess (D1-D7; DD1-DD9) in said back plate (5; 105) permitting flexing of the portion of the mem-

brane (7; 107) which surrounds the back end of said port (A1-A7; AA1-AA9) away from the front plate (3; 103) to unblock the back end of said port (A1-A7; AA1-AA9) and allow flow of ink from the port (A1-A7; AA1-AA9) to and through the recess (B1-B7; BB1-BB9) in the back face (3B; 103B) of the front plate (3; 103).

3. A printhead according to claim 1 or claim 2 characterised in that the holding means (47; 147) for the membrane (7; 107) comprises a member (49) slidable in the hole (51) and biased towards the membrane (7; 107) for pressing the membrane (7; 107) against the back face (3B; 103B) of the front plate (3; 103) around the back end of said port (A1-A7; AA1-AA9), and a solenoid (55) for pulling said member (49) away from the membrane (7; 107).
4. A printhead according to one of claims 1 to 3, characterised in that the recess (B1-B7) comprises an elongate groove extending in a direction away from the port (A1-A7) having a first end (19) adjacent but spaced from the back end of the port (A1-A7) and a second end (21) spaced from said first end (19), said printhead being particularly for small character printing and having at least one set of said ports (A1-A7) and a plurality of said grooves, one groove for each port (A1-A7) of said set, said ports (A1-A7) being spaced at intervals, said grooves converging from said ports (A1-A7) with their said second ends (21) closer together than the ports (A1-A7) and said passages (C1-C7) extending through the body (3) from the grooves adjacent their said second ends (21) to the front face (3F) of the body (3) for closer spacing of the passages (C1-C7) than the ports (A1-A7), and a plurality of said holding means (47), one for each port (A1-A7).
5. A printhead according to any one of claims 1 to 3, characterised in that it is particularly for bar code printing and has a plurality of said passages (CC1-CC9) extending forward from the recess (BB1-BB9) through the body (103) to the front face (103F) of the body (103).
6. A printhead (1; 101) for ink jet printing apparatus comprising:
 - a front plate (3; 103) having a front face (3F; 103F), a back face (3B; 103B), a top edge (3t; 103t) and a bottom edge (3b; 103b);
 - said plate (3; 103) having an elongate chamber (13, 15; 113, 115) therein for ink under pressure;
 - a set of ports (A1-A7; AA1-AA9) extending



from the chamber (13, 15; 113, 115) to the back of the front plate (3; 103) spaced at intervals along the length of the chamber (13, 15; 113, 115);

at least one passage (C1-C7; CC1-CC9) extending forward through the front plate (3; 103) to its front face (3F; 103F), the end of each passage (C1-C7, CC1-CC9) at said front face (3F; 103F) constituting an orifice (O1-O7; OO1-OO9) for delivery of ink onto a target surface moving relative to the front plate (3; 103) past its front face (3F; 103F);

a flexible membrane (7; 107) at the back of the front plate (3; 103) engageable all around the back end of each said port (A1-A7; AA1-AA9);

a back plate (5; 105) having a front face (5F; 105F) and a back face (5B; 105B) secured on the back of the front plate (3; 103) with the membrane (7; 107) therebetween;

said back plate (5; 105) and said front plate (3; 103) having passaging (39, 41, 43, 45, 130, 131) for supplying ink under pressure through the back plate (5; 105) from the back of the back plate (5; 105) to the chamber (13, 15; 113; 115);

and means (47; 147) associated with the back plate (5; 105) for releasably holding the membrane (7; 107) pressed against and around the back end of each said port (A1-A9; AA1-AA9) to block flow of ink from the chamber (13, 15; 113, 115) out of the back end of the port (A1-A7; AA1-AA9);

said holding means (47; 147) being operable to release the membrane (7; 107) for flexing away from the back end of each said port (A1-A7; AA1-AA9) for delivery of ink from port (A1-A7; AA1-AA9) through the back end of the port (A1-A7; AA1-AA9) and thence to and through the respective passage (C1-C7; CC1-CC9);

characterised in that the ports (A1-A7; AA1-AA9) extend from the chamber (13, 15; 113, 115) to the back face (3B; 103B) of the front plate (3; 103);

that a set of recesses (B1-B7; BB1-BB9), one for each port (A1-A7; AA1-AA9), is formed in the back face (3B; 103B) of the front plate (3; 103) adjacent but spaced from the end of the port (A1-A7; AA1-AA9) at the back face (3B; 103B) of the front plate (3; 103) constituting the back end of the port (A1-A7; AA1-AA9);

that a passage (C1-C7; CC1-CC9) extends forward from each recess (B1-B7; BB1-BB9) to the orifice (O1-O7; OO1-OO9) at the front face (3F; 103F) of the front plate (3; 103);

that the flexible membrane (7; 107) engages with said back face (3B; 103B) of the

front plate (3; 103) all around each said recess (B1-B7; BB1-BB9), as well as around each said port (A1-A7; AA1-AA9); and

that the holding means (47; 147) releasably holds the membrane (7; 107) pressed against the back face (3B; 103B) of the front plate (3; 103) around the back end of each port (A1-A7; AA1-AA9) to block flow of ink from the chamber (13, 15; 113, 115) out of the back end of the port (A1-A7; AA1-AA9).

7. A printhead according to claim 6, characterised in that the back plate (5; 105) has holes (51) therein for said holding means (47; 147) extending from the back face (5B; 105B) to the front face (5F; 105F) of the back plate (5; 105) in line with said ports (A1-A7; AA1-AA9), said holding means (47; 147) for each port (A1-A7; AA1-AA9) comprising a member (49) slidable in the respective hole (51) and biased toward the membrane (7; 103) around the back end of the respective port (A1-A7; AA1-AA9), and solenoids (55) for pulling said members (49) away from the membrane (7; 107), and that the back plate (5; 105) has recesses (D1-D7; DD1-DD9) in its front face (3; 103) and generally in register therewith, permitting flexing of the portions of the membrane (7; 107) which surround the back ends of said ports (A1-A7; AA1-AA9) away from the front plate (3; 103) to unblock the back ends of said ports (A1-A7; AA1-AA9) and allow flow of ink from each port (A1-A7; AA1-AA9) to and through the respective recess (B1-B7; BB1-BB9) in the back face (3B; 103B) of the front plate (3; 103).

8. A printhead according to claim 6 or claim 7, characterised in that it is particularly for small character printing and that each recess (B1-B7) comprises an elongate groove extending away from the respective port (A1-A7) generally in radial direction relative to the port (A1-A7), each recess (B1-B7) having a first end (19) adjacent but spaced from the back end of the respective port (A1-A7) and a second end (21) spaced from the first end (19), said ports (A1-A9) being spaced at intervals along said chambers (13, 15), and said grooves converging from said ports (A1-A7) with their said second ends (21) closer together than the ports (A1-A7) and said passages (C1-C7) extending through the front plate (3) from the grooves adjacent their second ends (21) to the front face (3F) of the front plate (3) for closer spacing of the passages (C1-C7) and orifices (O1-O7) than the ports (A1-A7).



9. A printhead according to claim 6 or claim 7, characterised in that it is particularly for bar code printing and has a plurality of said passages (CC1-CC9) extending forward from each recess (BB1-BB9) through said front plate (103) to the front faces (103F) thereof. 5
10. A printhead according to any one of claims 6 to 9, characterised in that it has a plurality of orifices (O1-O7; OO1-OO9) at the front face, (3F; 103F) and means for inhibiting drying out of ink in the orifices (O1-O7; OO1-OO7) comprising a cover plate (151) having a recess (153; 163) in one face thereof for holding an ink solvent at the front of the orifices (O1-O7; OO1-OO9), and means (160, 161) for removably securing said coverplate (151) on the front face (3F; 103F) of the front plate (3; 103) of the printhead (1; 101) with the recess (153; 163) facing said front plate (3; 103). 10 15 20

Patentansprüche

1. Druckkopf (1;101) für Tintenstrahldruckvorrichtung mit 25
- einem Körper (3;103) mit einer Frontseite (3F; 103F) und einer Rückseite (3B; 103B),
 - einer Kammer (13,15; 113,115) in dem Körper (3;103) für unter Druck stehende Tinte,
 - einer sich von der Kammer (13,15; 113,115) zur Rückseite des Körpers (3; 103) erstreckende Öffnung (A1-A7; AA1-AA9), 30
 - einem Kanal (C1-C7; CC1-CC9), der sich durch den Körper (3; 103) zur Frontseite (3F; 103F) des Körpers (3;103) erstreckt, wobei das Ende des Kanals (C1-C7; DD1-CC9) an der Frontseite (3F; 103F) eine Mundung (O1-O7; OO1-OO9) zur Abgabe der Tinte auf eine sich relativ zu dem Körper (3; 103) an seiner Frontseite (3F; 103F) vorbeibewegende Zieloberfläche bildet, 40
 - einer flexiblen Membran (7; 107) an der Rückseite des Körpers (3; 103) zur Steuerung des Tintenflusses zu dem und durch den Kanal (C1-C7; CC1-CC9), und 45
 - Mitteln (47; 147) zum lösbaren Halten der gegen das hintere Ende der genannten Öffnung (A1-A7; AA1-AA9) gedrückten Membran (7; 107) zwecks Blockierung des Tintenflusses von der genannten Kammer (13,15; 113,115) aus dem hinteren Ende der Öffnung (A1-A7; AA1-AA9), wobei die genannten Haltemittel (47; 147) betätigbar sind, um die Membran (7; 107) freizugeben, damit sie sich von dem hinteren Ende der Öffnung (A1-A7; AA1-AA9) abbiegen kann, um Tinte aus der genannten Kammer (13,15; 113,115) durch das hintere Ende der Öffnung (A1-A7; AA1-AA9) und dann 50 55

zu dem und durch den genannten Kanal (C1-C7; CC1-CC9) zu liefern,

dadurch gekennzeichnet, daß die Öffnung (A1-A7; AA1-AA9) sich von der Kammer (13,15; 113,115) zur Rückseite (3B; 103B) des Körpers (3; 103) erstreckt,

daß in der Rückseite (3B; 103B) des Körpers (3; 103) nahe, jedoch mit Abstand von dem Ende der Öffnung (A1-A7; AA1-AA9) an der Rückseite (3B; 103B) eine Ausnehmung (B1-B7; BB1-BB9) ausgebildet ist, die das rückwärtige Ende der Öffnung (A1-A7; AA1-AA9) bildet,

daß der Kanal (C1-C7; CC1-CC9) sich von der Ausnehmung (B1-B7; BB1-BB9) zur Mundung (O1-O7; OO1-OO9) an der Frontseite (3F; 103F) des Körpers (3; 103) erstreckt,

daß die flexible Membran (7; 107) mit der Rückseite (3B; 103B) des Körpers (3; 103) um die gesamte Ausnehmung herum (B1-B7; BB1-BB9) wie auch um das hintere Ende der Öffnung (A1-A7; AA1-AA9) herum in Eingriff ist, und

daß das Haltemittel (47; 147) betätigbar ist, um die Membran (7; 107) freizugeben, damit sie sich von dem hinteren Ende der Öffnung (A1-A7; AA1-AA9) abbiegen kann, um Tinte aus der genannten Kammer (13,15; 113,115) durch das hintere Ende der Öffnung (A1-A7; AA1-AA9) und daher durch die genannte Ausnehmung (B1-B7; BB1-BB9) zu und durch den genannten Kanal (C1-C7; CC1-CC9) zu liefern.

2. Druckkopf nach Anspruch 1, dadurch gekennzeichnet, daß der Körper (3; 103) eine die Frontplatte des Druckkopfes (1; 101) bildende Platte hat und daß die Membran (7; 107) durch eine Rückplatte (5; 105) gegen die Rückseite (3B; 103B) der Frontplatte (3; 103) gehalten wird, wobei die Rückplatte (5; 105) eine an der Membran (7; 107) angreifende Frontseite (5F; 105F) hat, wobei die Rückseite (5B; 105B) und ein Loch (51) für die genannten Haltemittel (47; 147) sich von seiner Rückseite (5B; 105B) zu seiner Vorderseite (5F; 105F) in Ausrichtung mit der genannten Öffnung (A1-A7; AA1-AA9) erstrecken, die genannte Rückplatte (5; 105) ferner in seiner Frontseite (5F; 105F) eine im allgemeinen in Register mit der Ausnehmung (B1-B7; BB1-BB9) in der Rückseite (3B; 103B) der Frontplatte befindlicher Ausnehmung (D1-D7; DD1-DD9) hat und sich von dem genannten Loch (51) weg erstreckt, und wobei das genannte Loch (51) und die genannte Ausnehmung (D1-D7; DD1-DD9) in der Rückplatte (5; 105) die Biegung des Teils der Membran (7; 107), das das hintere Ende der Öffnung (A1-A7; AA1-AA9) umgibt, von der Frontplatte (3; 103) 50 55



weg ermöglicht, um das hintere Ende der genannten Öffnung (A1-A7; AA1-AA9) freizugeben und den Tintenfluß von der Öffnung (A1-A7; AA1-AA9) zu und durch die Ausnehmung (B1-B7; BB1-BB7) in der Rückseite (3B; 103B) der Frontplatte (3; 103) zu ermöglichen.

3. Druckkopf nach Anspruch 1 oder Anspruch 2, dadurch gekennzeichnet, daß das Haltemittel (47; 147) für die Membran (7; 107) ein in dem Loch (51) gleitbares und gegen die Membran (7; 107) vorgespanntes Element (49) zum Drücken der Membran (7; 107) gegen die Rückseite (3B; 103B) der Frontplatte (3; 103) um das hintere Ende der genannten Öffnung (A1-A7; AA1-AA9) herum, und ein Solenoid (55) zum Abziehen des Elements (49) von der Membran (7; 107) umfaßt.

4. Druckkopf nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß die Ausnehmung (B1-B7) eine längliche, sich in einer Richtung von der Öffnung (A1-A7) weg erstreckende Rille mit einem ersten Ende (19), das nahe aber auf Abstand von dem hinteren Ende der Öffnung (A1-A7) ist, und einem zweiten, von dem ersten Ende (19) auf Abstand gehaltenen zweiten Ende (21) aufweist, der Druckkopf besonders zum Drucken kleiner Zeichen dient und wenigstens einen Satz der genannten Öffnungen (A1-A7) und eine Mehrzahl der genannten Rillen hat, wobei eine Rille für jede Öffnung (A1-A7) des genannten Satzes dient, die genannten Öffnungen (A1-A7) in Intervallen angeordnet sind, die Rillen von den genannten Öffnungen (A1-A7) konvergieren, wobei ihre genannten zweiten Enden (21) dichter als die Öffnungen (A1-A7) zusammenliegen und die genannten Kanäle (C1-C7) sich von einer Stelle nahe den zweiten Enden (21) der Rillen durch den Körper (3) zur Frontseite (3F) des Körpers (3) erstrecken, so daß die Kanäle (C1-C7) einen geringeren Abstand als die Öffnungen (A1-A7) haben, und wobei eine Mehrzahl der genannten Haltemittel (47), eine für jede Öffnung (A1-A7), vorgesehen ist.

5. Druckkopf nach irgendeinem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß er besonders für Strichkodendruck dient und mehrere Kanäle (CC1-CC9) hat, die sich von der Ausnehmung (BB1-BB9) durch den Körper (103) vorwärts zur Frontseite (103F) des Körpers (103) erstrecken.

6. Druckkopf (1; 101) für Tintenstrahldruckvorrichtung mit einer Frontplatte (3; 103) mit einer Front-

seite (3F; 103F), einer Rückseite (3B; 103B), einer Oberkante (3t; 103t) und einer Unterkante (3b; 103b),

wobei die Platte (3; 103) eine längliche Kammer (13,15; 113,115) für unter Druck stehende Tinte enthält,

einem Satz Öffnungen (A1-A7; AA1-AA9), die sich von der Kammer (13,15; 113,115) zur Rückseite der Frontplatte (3; 103) erstrecken und längs der Länge der Kammer (13,15; 113,115) in Intervallen angeordnet sind,

wenigstens einem sich durch die Frontplatte (3; 103) zu ihrer Frontseite (3F; 103F) erstreckenden Kanal (C1-C7; CC1-CC9), dessen Ende an der genannten Frontseite (3F; 103F) eine Mündung (01-07; 001-009) zur Abgabe der Tinte auf eine sich relativ zu dem Körper (3; 103) an seiner Frontseite (3F; 103F) vorbeibewegende Zieloberfläche bildet,

einer flexiblen Membran (7; 107) an der Rückseite der Frontplatte (3; 103), die um das hintere Ende jeder genannten Öffnung (A1-A7; AA1-AA9) herum anlegbar ist,

einer Rückplatte (5; 105) mit einer Frontseite (5F; 105F) und einer Rückseite (5B; 105B), die unter Zwischenlage der Membran (7; 107) an der Rückseite der Frontplatte (3; 103) angebracht ist,

wobei die genannte Rückplatte (5; 105) und die genannte Frontplatte (3; 103) Durchgänge (39,41,43,45,130,131) für die Zuführung von Tinte unter Druck von der Rückseite der Rückplatte (5; 105) durch die Rückplatte (5; 105) zu der Kammer (13,15; 113,115) hat,

und Mitteln (47; 147) in Verbindung mit der Rückplatte (5; 105) zum lösaren Halten der Membran (7; 107) in Andruck an dem und um das hintere Ende jeder genannten Öffnung (A1-A9; AA1-AA9), um den Tintenausfluß aus der Kammer (13,15; 113,115) aus dem hinteren Ende der Öffnung (A1-A7; AA1-AA9) zu blockieren,

wobei das genannte Haltemittel (47; 147) betätigbar ist, um die Membran (7; 107) freizugeben, damit sie sich von dem hinteren Ende jeder Öffnung (A1-A7; AA1-AA9) abbiegen kann, um Tinte von der Öffnung (A1-A7; AA1-AA9) durch das hintere Ende der Öffnung (A1-A7; AA1-AA9) und daher zu und durch den betreffenden Kanal (C1-C7; CC1-CC9) zu liefern,

dadurch gekennzeichnet, daß die Öffnungen (A1-A7; AA1-AA9) sich von der Kammer (13,15; 113,115) zur Rückseite (3B; 103B) der Frontplatte (3; 103) erstrecken,

daß ein Satz Ausnehmungen (B1-B7; BB1-BB9), und zwar eine für jede Öffnung (A1-A7; AA1-AA9), in der Rückseite (3B; 103B) der



Frontplatte (3; 103) nahe an, aber mit Abstand von dem Ende der Öffnung (A1-A7; AA1-AA9) an der das hintere Ende der Öffnung (A1-A7; AA1-AA9) bildenden Rückseite (3B; 103B) der Frontplatte (3; 103) ausgebildet ist,

daß ein Kanal (C1-C7; CC1-CC9) sich von jeder Ausnehmung (B1-B7; BB1-BB9) vorwärts zur Mündung (01-07; 001-009) an der Frontseite (3F; 103F) der Frontplatte (3; 103) erstreckt,

daß die flexible Membran (7; 107) mit der Rückseite (3B; 103B) der Frontplatte (3; 103) um die gesamte Ausnehmung (B1-B7; BB1-BB9) herum wie auch um jede Öffnung (A1-A7; AA1-AA9) herum in Eingriff ist, und

daß das Haltemittel (47; 147) die Membran (7; 107) lösbar gegen die Rückseite (3B; 103B) der Frontplatte (3; 103) um das hintere Ende jeder Öffnung (A1-A7; AA1-AA9) gedrückt hält, um den Tintenausfluß von der Kammer (13,15; 113,115) aus dem hinteren Ende der Öffnung (A1-A7; AA1-AA9) zu blockieren,

7. Druckkopf nach Anspruch 6, dadurch gekennzeichnet, daß die Rückplatte (5; 105) Löcher (51) für das genannte Haltemittel (47; 147) hat, die sich von der Rückseite (5B; 105B) zu der Frontseite (5F; 105F) der Rückplatte (5; 105) in Ausrichtung mit den genannten Öffnungen (A1-A7; AA1-AA9) erstrecken, wobei das genannte Haltemittel (47; 147) für jede Öffnung (A1-A7; AA1-AA9) ein in dem betreffenden Loch (51) gleitbares und gegen die Membran (7; 107) um das hintere Ende der betreffenden Öffnung (A1-A7; AA1-AA9) herum vorgespanntes Element und Solenoide (55) zum Abziehen der genannten Elemente (49) von der Membran (7; 107) umfassen, und daß die Rückplatte (5; 105) Ausnehmungen (D1-D7; DD1-DD9) in ihrer Frontseite (3; 103) und im allgemeinen im Register mit dieser hat, wodurch Teile der Membran (7; 107), die die hinteren Enden der Öffnungen (A1-A7; AA1-AA9) umgibt, von der Frontplatte (3; 103) weggebogen werden können, um die hinteren Enden der genannten Öffnungen (A1-A7; AA1-AA9) freizugeben und den Tintenfluß aus jeder Öffnung (A1-A7; AA1-AA9) zu und durch die betreffende Ausnehmung (B1-B7; BB1-BB9) in der Rückseite (3B; 103B) der Frontplatte (3; 103) zu ermöglichen.

8. Druckkopf nach Anspruch 6 oder Anspruch 7, dadurch gekennzeichnet, daß er besonders für den Druck kleiner Zeichen dient und daß jede Ausnehmung (B1-B7) eine sich von der betreffenden Öffnung (A1-A7) allgemein in radialer Richtung zu der Öffnung (A1-A7) weg erstreckende, längliche Rille aufweist, von denen jede ein nahe an, aber mit Abstand von dem hinte-

ren Ende der betreffenden Öffnung (A1-A7) befindliches erstes Ende (19) und ein mit Abstand von dem ersten Ende (19) angeordnetes zweites Ende (21) hat, wobei die Öffnungen (A1-A7) längs der genannten Kammern (13,15) in Intervallen angeordnet sind und die genannten Rillen von den genannten Öffnungen (A1-A7) konvergieren, wobei ihre zweiten Enden (21) dichter zusammen als die Öffnungen (A1-A7) sind und die genannten Kanäle (C1-C7) sich von nahe den zweiten Enden (21) der Rillen durch die Frontplatte (3) zu der Frontseite (3F) der Frontplatte (3) erstrecken, so daß die Kanäle (C1-C7) und Mündungen (01-07) einen geringeren Abstand als die Öffnungen (A1-A7) haben.

9. Druckkopf nach Anspruch 6 oder Anspruch 7, dadurch gekennzeichnet, daß er besonders für Strichkodendruck dient und mehrere Kanäle (CC1-CC9) hat, die sich von jeder Ausnehmung (BB1-BB9) durch die Frontplatte (103) zu deren Frontseiten (103F) erstrecken.

10. Druckkopf nach irgendeinem der Ansprüche 6 bis 9, dadurch gekennzeichnet, daß er eine Mehrzahl von Mündungen (01-07 ; 001-009) an der Frontseite (3F; 103F), Mittel zur Verhinderung des Austrocknens der Tinte in den Mündungen (01-07; 001-007), die eine Deckplatte (151) mit einer Ausnehmung (153; 163) in ihrer einen Seite zur Aufnahme eines Tintenlösungsmittels vor den Mündungen (01-07; 001-009) umfassen, und Mittel (160,161) zur entfernbaren Anbringung der genannten Deckplatte (151) auf der Frontseite (3F; 103F) der Frontplatte (3; 103) des Druckkopfes (1; 101) hat, wobei die Ausnehmung (153; 163) der Frontplatte (3; 103) zugewandt ist.

Revendications

1. Tête d'impression (1 ; 101) pour dispositif d'impression à jet d'encre comprenant :
un corps (3 ; 103) ayant une face avant (3F ; 103F) et une face arrière (3B ; 103B) ;
une chambre (13,15 ; 113, 115) dans le corps (3 ; 103) pour de l'encre sous pression ;
un orifice (A1-A7 ; AA1-AA9) s'étendant depuis la chambre (13,15 ; 113, 115) jusqu'à l'arrière du corps (3 ; 103) ;
un passage (C1-C7 ; CC1-CC9) s'étendant vers l'avant à travers le corps (3 ; 103) jusqu'à la face avant (3F ; 103F) du corps (3 ; 103), l'extrémité dudit passage (C1-C7 ; CC1-CC9) à ladite face avant (3F ; 103F) constituant une ouverture (01-07 ; 001-009) pour délivrer de l'encre sur une surface cible se déplaçant par



rapport au corps (3 ; 103) en passant devant sa face avant (3F ; 103F) ;

une membrane flexible (7 ; 107) à l'arrière dudit corps (3 ; 103) pour commander l'écoulement d'encre vers et à travers ledit passage (C1-C7 ; CC1-CC9) ; et

des moyens (47 ; 147) pour maintenir de manière amovible la membrane (7 ; 107) appuyée contre l'extrémité arrière dudit orifice (A1-A7 ; AA1-AA9) afin de bloquer l'écoulement d'encre depuis ladite chambre (13,15 ; 113, 115) hors de l'extrémité arrière dudit orifice (A1-A7 ; AA1-AA9), lesdits moyens de maintien (47 ; 147) fonctionnant pour relâcher la membrane (7 ; 107) pour la faire fléchir en s'éloignant de l'extrémité arrière de l'orifice (A1-A7 ; AA1-AA9) pour délivrer de l'encre à partir de ladite chambre (13,15 ; 113, 115) à travers l'extrémité arrière de l'orifice (A1-A7 ; AA1-AA9) et de là vers et à travers ledit passage (C1-C7 ; CC1-CC9) ; caractérisée en ce que l'orifice (A1-A7 ; AA1-AA9) s'étend depuis la chambre (13,15 ; 113, 115) jusqu'à la face arrière (3B ; 103B) du corps (3 ; 103) ;

en ce qu'une cavité (B1-B7 ; BB1-BB9) est formée dans la face arrière (3B ; 103B) du corps (3 ; 103), voisine mais espacée de l'extrémité de l'orifice (A1-A7 ; AA1-AA9), à la face arrière (3B ; 103B) constituant l'extrémité arrière de l'orifice (A1-A7 ; AA1-AA9) ;

en ce que le passage (C1-C7 ; CC1-CC9) s'étend vers l'avant depuis la cavité (B1-B7 ; BB1-BB9) jusqu'à l'ouverture (O1-O7 ; OO1-OO9) à la face avant (3F ; 103F) du corps (3 ; 103) ;

en ce que la membrane flexible (7 ; 107) est en contact avec la face arrière (3B ; 103B) du corps (3 ; 103) tout autour de la cavité (B1-B7 ; BB1-BB9), ainsi qu'autour de l'extrémité arrière dudit orifice (A1-A7 ; AA1-AA9) ; et

en ce que les moyens de maintien (47 ; 147) fonctionnent de façon à relâcher la membrane (7 ; 107) pour qu'elle fléchisse en s'écartant de l'extrémité arrière de l'orifice (A1-A7 ; AA1-AA9) pour délivrer de l'encre à partir de ladite chambre (13,15 ; 113, 115) à travers l'extrémité arrière de l'orifice (A1-A7 ; AA1-AA9) et de là à travers ladite cavité (B1-B7 ; BB1-BB9) vers et à travers ledit passage (C1-C7 ; CC1-CC9).

2. Tête d'impression selon la revendication 1, caractérisée en ce que le corps (3 ; 103) comprend une plaque constituant une plaque avant de la tête d'impression (1 ; 101) et en ce que la membrane (7 ; 107) est maintenue contre la face arrière (3B ; 103B) de ladite plaque avant (3 ; 103) par une plaque arrière (5 ; 105), ladite

plaque arrière (5 ; 105) ayant une face avant (5F ; 105F) en contact avec la membrane (7 ; 107), une face arrière (5B ; 105B) et un trou (51) pour lesdits moyens de maintien (47 ; 147) s'étendant à travers elle depuis sa face arrière (5B ; 105B) jusqu'à sa face avant (5F ; 105F) en alignement avec ledit orifice (A1-A7 ; AA1-AA9), ladite plaque arrière (5 ; 105) comprenant de plus un évidement (D1-D7 ; DD1-DD9) dans sa face avant (5F ; 105F) globalement aligné avec la cavité (B1-B7 ; BB1-BB9) dans la face arrière (3B ; 103B) de ladite plaque avant (3 ; 103) et s'étendant à partir dudit trou (51), ledit trou (51) et ledit évidement (D1-D7 ; DD1-DD9) dans ladite plaque arrière (5 ; 105) permettant la flexion de la partie de membrane (7 ; 107) qui entoure l'extrémité arrière dudit orifice (A1-A7 ; AA1-AA9) à l'écart de la plaque avant (3 ; 103) pour débloquer l'extrémité arrière dudit orifice (A1-A7 ; AA1-AA9) et permettre l'écoulement d'encre depuis l'orifice (A1-A7 ; AA1-AA9) vers et à travers la cavité (B1-B7 ; BB1-BB9) dans la face arrière (3B ; 103B) de la plaque avant (3 ; 103).

3. Tête d'impression selon la revendication 1 ou la revendication 2, caractérisée en ce que les moyens de maintien (47 ; 147) pour la membrane (7 ; 107) comprennent un élément (49) coulissant dans le trou (51) et sollicité vers la membrane (7 ; 107) pour appuyer la membrane (7 ; 107) contre la face arrière (3B ; 103B) de la plaque avant (3 ; 103) autour de l'extrémité arrière dudit orifice (A1-A7 ; AA1-AA9), et un solénoïde (55) pour éloigner ledit élément (49) de la membrane (7 ; 107).
4. Tête d'impression selon l'une des revendications 1 à 3, caractérisée en ce que la cavité (B1-B7) comprend une rainure allongée s'étendant dans une direction s'éloignant de l'orifice (A1-A7) ayant une première extrémité (19) voisine mais espacée de l'extrémité arrière de l'orifice (A1-A7) et une seconde extrémité (21) espacée de ladite première extrémité (19), ladite tête d'impression étant particulièrement destinée à l'impression de petits caractères et ayant au moins un ensemble de dits orifices (A1-A7) et une pluralité de dites rainures, une rainure pour chaque orifice (A1-A7) dudit ensemble, lesdits orifices (A1-A7) étant espacés par des intervalles, lesdites rainures convergeant depuis lesdits orifices (A1-A7) de sorte que leurs dites secondes extrémités (21) sont plus proches les unes des autres que les orifices (A1-A7) et lesdits passages (C1-C7) s'étendant à travers le corps (3) depuis les



rainures adjacentes à leurs dites secondes extrémités (21) jusqu'à la face avant (3F) du corps (3) pour un espacement plus rapproché des passages (C1-C7) que les orifices (A1-A7), et une pluralité de dits moyens de maintien (47), un pour chaque orifice (A1-A7).

5. Tête d'impression selon l'une des revendications 1 à 3, caractérisée en ce qu'elle est particulièrement destinée à l'impression d'un code barre et en ce qu'elle comprend une pluralité desdits passages (CC1-CC9) s'étendant vers l'avant depuis la cavité (BB1-BB9) à travers le corps (103) jusqu'à la face avant (103F) du corps (103).

6. Tête d'impression (1 ; 101) pour dispositif d'impression à jet d'encre comprenant :

une plaque avant (3 ; 103) présentant une face avant (3F ; 103F), une face arrière (3B ; 103B), un bord supérieur (3t ; 103t) et un bord inférieur (3b ; 103b) ;

ladite plaque (3 ; 103) comportant une chambre (13,15 ; 113, 115) allongée pour de l'encre sous pression ;

un ensemble d'orifices (A1-A7 ; AA1-AA9) s'étendant depuis la chambre (13,15 ; 113, 115) jusqu'à l'arrière de la plaque avant (3 ; 103) espacés par des intervalles sur la longueur de la chambre (13,15 ; 113, 115) ;

au moins un passage (C1-C7 ; CC1-CC9) s'étendant vers l'avant à travers la plaque avant (3 ; 103) jusqu'à sa face avant (3F ; 103F), l'extrémité de chaque passage (C1-C7 ; CC1-CC9) à ladite face (3F ; 103F) constituant une ouverture (O1-O7 ; OO1-OO9) pour délivrer de l'encre sur une surface cible se déplaçant par rapport à la plaque avant (3 ; 103) en passant devant sa face avant (3F ; 103F) ;

une membrane flexible (7 ; 107) à l'arrière de la plaque avant (3 ; 103) étant en contact tout autour de l'extrémité arrière de chacun desdits orifices (A1-A7 ; AA1-AA9) ;

une plaque arrière (5 ; 105) présentant une face avant (5F ; 105F) et une face arrière (5B ; 105B) fixée à l'arrière de la plaque avant (3 ; 103) en interposant la membrane (7 ; 107) ;

ladite plaque arrière (5 ; 105) et ladite plaque avant (3 ; 103) présentant des éléments de passage (39, 41, 43, 45, 130, 131), pour l'alimentation en encre sous pression à travers la plaque arrière (5 ; 105) à partir de l'arrière de la plaque arrière (5 ; 105) vers la chambre (13,15 ; 113, 115) ;

et des moyens (47 ; 147) associés avec la plaque arrière (5 ; 105) pour maintenir de façon amovible la membrane (7 ; 107) poussée contre et autour de l'extrémité arrière de cha-

cun desdits orifices (A1-A7 ; AA1-AA9) afin de bloquer l'écoulement d'encre depuis la chambre (13,15 ; 113, 115) hors de l'extrémité arrière de l'orifice (A1-A7 ; AA1-AA9) ;

lesdits moyens de maintien (47 ; 147) fonctionnant pour relâcher la membrane (7 ; 107) pour la faire fléchir en s'éloignant de l'extrémité arrière de l'orifice (A1-A7 ; AA1-AA9) pour délivrer de l'encre à partir de ladite chambre (13,15 ; 113, 115) à travers l'extrémité arrière de l'orifice (A1-A7 ; AA1-AA9) et de là vers et à travers le passage respectif (C1-C7 ; CC1-CC9) ;

caractérisée en ce que les orifices (A1-A7 ; AA1-AA9) s'étendent depuis la chambre (13,15 ; 113, 115) jusqu'à la face arrière (3B ; 103B) du corps (3 ; 103) ;

en ce qu'un ensemble de cavités (B1-B7 ; BB1-BB9), une pour chaque orifice, est formé dans la face arrière (3B ; 103B) du corps (3 ; 103), voisin mais espacé de l'extrémité de l'orifice (A1-A7 ; AA1-AA9) à la face arrière (3B ; 103B) de la plaque avant (3 ; 103) constituant l'extrémité arrière de l'orifice (A1-A7 ; AA1-AA9) ;

en ce qu'un passage (C1-C7 ; CC1-CC9) s'étend vers l'avant depuis chaque cavité (B1-B7 ; BB1-BB9) vers l'ouverture (O1-O7 ; OO1-OO9) à la face avant (3F ; 103F) de la plaque avant (3 ; 103) ;

en ce que la membrane flexible (7 ; 107) est en contact avec la face arrière (3B ; 103B) de la plaque avant (3 ; 103) tout autour de chaque cavité (B1-B7 ; BB1-BB9), ainsi qu'autour chacun desdits orifices (A1-A7 ; AA1-AA9) ; et

en ce que les moyens de maintien (47 ; 147) maintiennent de façon amovible la membrane (7 ; 107) poussée contre la face arrière (3B ; 103B) de la plaque avant (3 ; 103) autour de l'extrémité arrière de chacun desdits orifices (A1-A7 ; AA1-AA9) afin de bloquer l'écoulement d'encre depuis la chambre (13,15 ; 113, 115) hors de l'extrémité arrière de l'orifice (A1-A7 ; AA1-AA9).

7. Tête d'impression selon la revendication 6, caractérisée en ce que la plaque arrière (5 ; 105) comporte des trous (51) pour lesdits moyens de maintien (47 ; 147) s'étendant depuis la face arrière (5B ; 105B) jusqu'à la face avant (5F ; 105F) de la plaque arrière (5 ; 105) en alignement avec lesdits orifices (A1-A7 ; AA1-AA9), lesdits moyens de maintien (47 ; 147) pour chaque orifice (A1-A7 ; AA1-AA9) comprenant un élément (49) coulissant dans le trou (51) respectif et sollicité vers la membrane (7 ; 107) autour de l'extrémité arrière de l'orifi-



ce respectif (A1-A7 ; AA1-AA9), et des solénoïdes (55) pour éloigner lesdits éléments (49) de la membrane (7 ; 107), et en ce que la plaque arrière (5 ; 105) comprend des évidements (D1-D7 ; DD1-DD9) dans sa face avant (5F ; 105F) globalement alignés avec elles, permettant la flexion des parties de membrane (7 ; 107) qui entourent les extrémités arrière desdits orifices (A1-A7 ; AA1-AA9) à l'écart de la plaque avant (3 ; 103) pour débloquer les extrémités arrière desdits orifices (A1-A7 ; AA1-AA9) et permettre l'écoulement d'encre depuis chaque orifice (A1-A7 ; AA1-AA9) vers et à travers la cavité respective (B1-B7 ; BB1-BB9) dans la face arrière (3B ; 103B) de la plaque avant (3 ; 103).

prenant une plaque de couverture (151) présente un évidement (153 ; 163) dans une de ses faces pour retenir un solvant d'encre à l'avant des ouvertures (O1-O7 ; OO1-OO9), et des moyens (160, 161) pour fixer de manière amovible ladite plaque de couverture (151) sur la face avant (3F ; 103F) de la plaque avant (3 ; 103) de la tête d'impression (1 ; 101), l'évidement (153 ; 163) faisant face à ladite plaque avant (3 ; 103).

8. Tête d'impression selon l'une des revendications 6 ou 7, caractérisée en ce qu'elle est particulièrement destinée à l'impression de petits caractères et en ce que chaque cavité (B1-B7) comprend une rainure allongée s'étendant dans une direction globalement radiale par rapport à l'orifice (A1-A7) et s'éloignant de l'orifice (A1-A7) respectif, chaque cavité (B1-B7) ayant une première extrémité (19) voisine mais espacée de l'extrémité arrière de l'orifice respectif (A1-A7) et une seconde extrémité (21) espacée de ladite première extrémité (19), lesdits orifices (A1-A7) étant espacés par des intervalles le long desdites chambres (13, 15) et lesdites rainures convergeant depuis lesdits orifices (A1-A7) de sorte que leurs dites secondes extrémités (21) sont plus proches les unes des autres que les orifices (A1-A7) et lesdits passages (C1-C7) s'étendant à travers la plaque avant (3) depuis les rainures adjacentes à leurs dites secondes extrémités (21) jusqu'à la face avant (3F) de la plaque avant (3) pour un espacement plus rapproché des passages (C1-C7) et des ouvertures (O1-O7) que les orifices (A1-A7).
9. Tête d'impression selon l'une des revendications 6 ou 7, caractérisée en ce qu'elle est particulièrement destinée à l'impression d'un code barre et en ce qu'elle comprend une pluralité desdits passages (CC1-CC9) s'étendant vers l'avant depuis chaque cavité (BB1-BB9) à travers ladite plaque avant (103) jusqu'aux faces avant (103F) de celle-ci.
10. Tête d'impression selon l'une quelconque des revendications 6 à 9, caractérisé en ce qu'elle comporte une pluralité d'ouvertures (O1-O7 ; OO1-OO9) à la face avant (3F ; 103F) et des moyens pour empêcher le séchage de l'encre dans les ouvertures (O1-O7 ; OO1-OO9), com-