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(54) Printer with zero insertion force printhead cartridge

(57) An inkjet printer has a printhead cartridge with a pagewidth printhead defining an array of nozzles for ejecting ink onto a media substrate. The printhead cartridge has a fluid coupling in fluid communication with the array of nozzles. The printer also has a cradle for supporting the printhead cartridge such that the array of nozzles is adjacent a media feed path extending through the printer, the cradle having a latch mechanism for retaining the printhead cartridge, an ink reservoir for containing supply of ink and a complementary coupling for fluid communication with the ink reservoir. The fluid coupling and the complementary coupling are configured to establish a sealed fluid connection using mechanical advantage provided by user actuation of the latch mechanism to retain the printhead cartridge in the cradle.

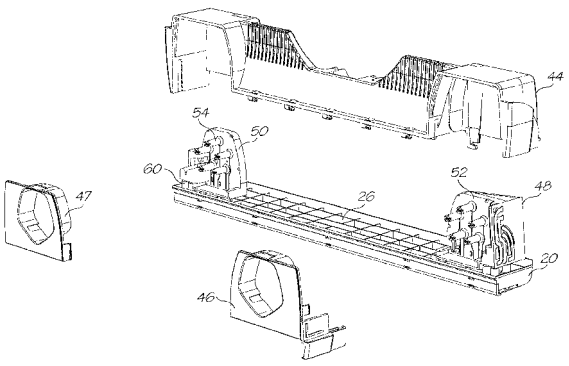

FIG. 5

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to be field of printers and in particular pagewidth inkjet printers.

BACKGROUND OF THE INVENTION

[0002] The Applicant has developed a wide range of printers that employ pagewidth printheads instead of traditional reciprocating printhead designs. Pagewidth designs increase print speeds as the printhead does not traverse back and forth across the page to deposit a line of an image. The pagewidth printhead simply deposits the ink on the media as it moves past at high speeds. Such printheads have made it possible to perform full colour 1600dpi printing at speeds in the vicinity of 60 pages per minute, speeds previously unattainable with conventional inkjet printers.

[0003] The high print speeds require a large ink supply flow rate. Not only are the flow rates higher but distributing the ink along the entire length of a pagewidth printhead is more complex than feeding ink to a relatively small reciprocating printhead. To address the many issues associated with supplying ink to a pagewidth printhead, the applicant has developed an active fluidic system which gives the user control of the ink flow through the printhead. The active fluidic system is described in detail in the applicant scope pending application USSN 11/872718, the contents of which is incorporated herein by cross-reference. The active fluidic system connects the pagewidth printhead to an ink supply reservoir via a pump or pressure pulse generator. The pagewidth printhead is also connected to a waste ink outlet or sump. While the active fluidic system can correct problems such as nozzle deprime, air bubbles, nozzle face floods and de-cap clogging, it will not fix "dead" nozzles that simply bum out or otherwise fail over the life of the printhead.

SUMMARY OF THE INVENTION

[0004] Accordingly, in a first aspect the present invention provides a printhead maintenance facility for an inkjet printhead, the printhead maintenance facility comprising:

a core structure for mounting in an inkjet printer for movement relative to an inkjet printhead, the core structure having a plurality of maintenance station mounting sites, each with engagement formations; and,

a plurality of maintenance structures for operation with the printhead, the plurality of maintenance structures each being mountable to at least one other of the plurality of maintenance station mounting sites.

[0005] With a maintenance facility that can interchange the order in which the maintenance stations present to the printhead, the maintenance regime can be tailored to the particular style of printhead and the properties of ink that it uses. Furthermore, the individual maintenance structures can be replaced when they start to wear or perish. Alternatively, if particular maintenance structure designs are modified or improved, they can replace the superseded design without needing to replace the whole maintenance facility or indeed printer. Similarly, if the printhead design is changed, the maintenance structures can be redesigned to suit the new printhead, and the order in which they act on the printhead can be selected to optimum printhead maintenance.

[0006] Preferably, the maintenance structures are selected from the following:

a print platen;
a spittoon;
a capper;
a primer; and,
a wiper.

[0007] In a particularly preferred form, the printhead is a pagewidth printhead with an array of nozzles formed in a nozzle face that extends the printing width of a media substrate and the core is an elongate structure for mounting in the printer adjacent the printhead such that its longitudinal extent is parallel that of the array of nozzles. Conveniently, the core is mounted in the printer such that it can rotate about its longitudinal axis to present each of the maintenance structures to the printhead. Preferably, maintenance mounting sites are sockets in the core for receiving the maintenance structures. Optionally, the maintenance mounting sites are provided by formations fixed to the surface of the core. In some forms, the formations are longitudinally extending slots for slidably receiving the maintenance structures. Preferably, the plurality of maintenance structures are each mountable to any of the plurality of maintenance station mounting sites.

[0008] In another preferred form, the core structure is at least partially formed from a porous polymer able to absorb ink by capillary action. In another preferred form, the core has at least one hollow cavity for containing ink. In a particularly preferred form, the core has a drain for draining absorbed ink out of the core. In some forms, the at least one hollow cavity contains fibrous material for wicking ink away from the maintenance structures. In specific embodiments, the core has a cylindrical tube of porous polymer material defining a central cavity filled with micro-fiber material. In particularly preferred embodiments, the cylindrical tube is compressed polymer particles. Preferably, the compressed polymer particles have a surface treatment such that the porous polymer material is hydrophilic.

[0009] Accordingly, in a second aspect the present invention provides a maintenance facility for an inkjet printer having a pagewidth printhead and a media path for feeding sheets of media substrate in a media feed direction, the pagewidth printhead having an elongate array

of nozzles extending the printing width of the media substrate, the maintenance facility comprising:

a wiper member extending the length of the nozzle array, the wiper member mounted in the printer adjacent the media path; and,
a maintenance drive for moving the wiper member such that it wipes the array of nozzles in a direction parallel to the media feed direction.

[0010] Wiping the nozzle array parallel to the media feed direction is much quicker than wiping transverse to the feed direction. The length of wiper travel is a fraction of the full pagewidth length of the printhead. Hence long sections of the printhead can be wiped in a single short wipe across the nozzle face before another wiper (or the same wiper displaced laterally along the printhead) performs the next wipe. If the tolerance control is precise, a single pagewidth wiper blade can be used to wipe the entire nozzle face in a single traverse. This allows the wiping process to occur during or immediately prior to print jobs without unduly extending the print times. The color mixing issues can be controlled by firing the nozzles to a blotting pad immediately after the wipe. As the wipe parallel to the feed direction is quick, there is little time for color mixing to occur before any contaminated ink is fired into the blotter.

[0011] Preferably, the wiper drive is configured to selectively move the wiper in the media feed direction or opposite the media feed direction. Preferably the wiper member has a plurality of wiper blades extending the length of the pagewidth printhead. In a further preferred form, the wiper blades are arranged in parallel rows. In a particularly preferred form, each of the plurality of rows has a series of the wiper blades aligned transverse to the feed direction, the wiper blades in adjacent rows are not in registration such that the wiper blades are staggered relative to each other with respect to the feed direction. In particularly preferred embodiments, the wiper blades are formed from an elastomeric material.

[0012] In some embodiments the maintenance drive is configured to rotate the wiper member about the axis extending transverse to the media feed direction. Preferably, the maintenance drive is reversible such that the wiper member can wipe the nozzle face in both directions during the maintenance cycle. Preferably, the maintenance drive is configured to move the wiper member across the nozzle face the variable speeds. In a further preferred form, the maintenance drive is configured to lift and lower the wiper member. In this form, the drive mechanism for lifting and lowering the wiper member is independent from the drive mechanism that rotates the wiper member.

[0013] In a further preferred form, the page width printhead is provided in the form of a user removable cartridge. In a particularly preferred form, the page with the printhead includes a series of printhead integrated circuits. Preferably be printhead integrated circuits are aligned with each other such that they extend transverse to the media feed direction.

[0014] Preferably the wiper member includes a tubular metal body for supporting the plurality of wiper blades. Preferably the tubular metal body supports a print platen positioned such that it presents to these printhead after these wiper blades have wiped the nozzle face.

[0015] Accordingly in a third aspect the present invention provides a printhead maintenance facility for an inkjet printhead, the printhead maintenance facility comprising:

the wiper member for contacting a nozzle face on an inkjet printhead, the wiper member having a resilient blade with the distal edge configured to flex upon contact with the nozzle face;
a doctor blade positioned to extend parallel with the resilient blade of the wiper member; and,
a maintenance drive configured to move the wiper member such that it travels over the nozzle face and then past the doctor blade such that the resilient blade is required to flex in order to pass the doctor blade: wherein upon disengagement of the resilient blade and the doctor blade, the resilient blade flicks back to its quiescent shape thereby flinging contaminants off its surface.

[0016] The invention has found that using a doctor blade is an effective way of cleaning the wiper blade because it not only scrapes contaminants from the surface but causes the wiper blade to flick any dirt or contaminants off the noncontact side of the blade. The doctor blade can be used in conjunction with a wiping pad and even more comprehensive clean.

[0017] Preferably, the maintenance drive is configured to rotate the wiper member in an arc such that the wiper blade contacts the nozzle face prior to engaging the doctor blade. Preferably, the maintenance drive is configured to move the wiper member such that the resilient blade travels over the nozzle face in a direction parallel to the media feed direction. Preferably being maintenance drive is configured to selectively move the wiper member in the media feed direction or opposite the media feed direction. In a particularly preferred form, the printer has a page with printhead such that the nozzle face defines an array of nozzles that extends the width of the media substrate. Preferably the one the member has a plurality of wiper blades extending length of the page with printhead. In a further preferred form, the wiper blades are arranged in parallel rows. In a particularly preferred form, each of the plurality of rows has a series of the wiper blades aligned transverse to feed direction, the wiper blades and adjacent rows are not in registrations such that the wiper blades are staggered relative to each other with respect to feed direction. In a particularly preferred form, the maintenance facility further comprises an absorbent pad for contacting the wiper blade to remove contaminants end of absorbing residual ink.

[0018] In some embodiments the maintenance drive

is configured to rotate the wiper member about the axis extending transverse to the media feed direction. Preferably the maintenance drive is reversible such that the wiper member can wipe the nozzle face in both directions during the main cycle. Preferably the maintenance drive is configured to move the wiper member across the nozzle face that the variable speeds. In a further preferred form, the maintenance drive is configured to lift and lower wiper member. In this form, the drive mechanism for lifting and lowering the wiper member is independent from the drive mechanism that rotate the wiper member.

[0019] In a further preferred form, the page with printhead is provided in the form of a user removable cartridge. In a particular preferred form, the page with printhead includes a series of printhead integrated circuits. Preferably the printhead integrated circuits are aligned with each other such that they extend transverse to the media feed direction.

[0020] Preferably the wiper member includes a tubular mental body for supporting the plurality of wiper blades. Preferably the tubular metal body supports a print platen positioned such that it presents two the printhead after the wiper blades wiped nozzle face.

[0021] Accordingly in a fourth aspect the present invention provides a maintenance facility for an inkjet printer having a printhead and a media path for feeding sheets of media substrate in a media feed direction, the printhead having an elongate array of nozzles, the maintenance facility comprising:

a wiper member extending at least the length of the nozzle array, the wiper member mounted in the printer adjacent the media path; and,

a maintenance drive for moving the wiper member such that it wipes the array of nozzles in a direction normal to its longitudinal extent.

[0022] Wiping across the elongate nozzle array is much quicker than wiping transverse to the feed direction. The length of wiper travel is a fraction of the full pagewidth length of the printhead. Hence the wiping process can be performed during or immediately prior to print jobs without unduly extending the print times. The color mixing issues can be controlled by firing the nozzles to a blotting pad immediately after the wipe. As the wipe parallel to the feed direction is quick, there is little time for color mixing to occur before any contaminated ink is fired into the blotter.

[0023] Preferably, the printhead is a pagewidth printhead such that the nozzle array extends the width of the media substrate. In a particularly preferred form, the wiper member moves parallel to the media feed direction. Preferably, the wiper drive is configured to selectively move the wiper in the media feed direction or opposite the media feed direction. Preferably the wiper member has a plurality of wiper blades extending the length of the pagewidth printhead. In a further preferred form, the wiper blades are arranged in parallel rows. In a particularly preferred form, each of the plurality of rows has a series of the wiper blades aligned transverse to the feed direction, the wiper blades in adjacent rows are not in registration such that the wiper blades are staggered relative to each other with respect to the feed direction. In particularly preferred embodiments, the wiper blades are formed from an elastomeric material.

[0024] In some embodiments the maintenance drive is configured to rotate the wiper member about the axis extending transverse to the media feed direction. Preferably, the maintenance drive is reversible such that the wiper member can wipe the nozzle face in both directions during the maintenance cycle. Preferably, the maintenance drive is configured to move the wiper member across the nozzle face the variable speeds. In a further preferred form, the maintenance drive is configured to lift and lower the wiper member. In this form, the drive mechanism for lifting and lowering the wiper member is independent from the drive mechanism that rotates the wiper member.

[0025] In a further preferred form, the page width printhead is provided in the form of a user removable cartridge. In a particularly preferred form, the page with the printhead includes a series of printhead integrated circuits. Preferably be printhead integrated circuits are aligned with each other such that they extend transverse to the media feed direction.

[0026] Preferably the wiper member includes a tubular metal body for supporting the plurality of wiper blades. Preferably the tubular metal body supports a print platen positioned such that it presents to these printhead after these wiper blades have wiped the nozzle face.

[0027] Accordingly in a fifth the present invention provides a maintenance facility for an ink jet printer having a pagewidth printhead and a media path for feeding sheets of media substrate in a media feed direction, the page with the printhead having an elongate array of nozzles extending the printing width of the media substrate, the maintenance facility comprising:

a tubular chassis mounting in the printer such that it can rotate about its longitudinal axis; and,

a plurality of maintenance stations mounted to an exterior surface of the tubular chassis; wherein,

at least one of the maintenance stations is a wiper member positioned for wiping contact with the elongate array of nozzles.

[0028] The invention uses a maintenance facility with the structural stiffness and rigidity of a tubular chassis to keep the contact pressure between the wiper member and the nozzle face constant. The tubular chassis also allows other maintenance stations to the present to the printhead in quick succession so that the complete maintenance regime is performed quickly. The Applicant has found that the nozzle face can be wiped in the media feed direction to reduce the wiper travel distance without causing colour mixing problems. By firing the nozzles

into a blotter or spittoon immediately after being wiped ejects any contaminated ink before it can diffuse into the ink supply lines. This keeps any contamination contained to me nozzles for, in the worst-case scenario, the chambers of ink the interjection actuators.

[0029] Preferably the tubular chassis is mounted in the printer such that its longitudinal axis is transverse to move media feed direction. In a further preferred form, the tubular chassis and the wiper member extend the length of the elongate array of nozzles. In some embodiments, the tubular chassis is an aluminium extrusion. In some embodiments, the tubular chassis has a plurality of extruded parts configured to snap lock together. Optionally, the tubular chassis has a plurality of extruded parts configured to sliding early engage each other. Preferably the tubular chassis has a generally rectangular cross section. Preferably the tubular chassis has a porous material housed in its central cavity. Preferably each side of the tubular chassis has mounting formations for engagement with corresponding formations on the maintenance stations. Conveniently, the mounting formations and the corresponding formations slide into engagement. Optionally the mounting formations and the corresponding formations snap lock together. In some forms, the maintenance stations can mount to different sides of the tubular chassis.

[0030] Preferably the wiper member is mounted to be tubular chassis such that it wipes the elongate array of nozzles in a direction parallel to the media feed direction. In a particularly preferred form, one of the maintenance stations is a spittoon with an absorbent element for receiving ejected ink. Preferably the absorbent element is in fluid communication with the porous material housed in the central cavity. Preferably the porous material is a porous rigid polymer.

[0031] Preferably the pagewidth printhead has a plurality of printhead ICs, each of the printhead ICs being aligned transverse to the media feed direction. By mounting the printhead ICs in a single line across the printhead, the elongate array of nozzles does not extend far in the direction parallel to the media feed direction. In light of this the length of travel of the wiper member across the printhead is reduced. This makes the wiping operation faster and more easily controlled with respect to be contact pressure on the nozzles.

[0032] In particularly preferred embodiments, the wiper member is a plurality of wiper blades formed from resilient material such that a distal edge of each blades flexes when wiping the elongate array of nozzles. Preferably the wiper blades are arranged in parallel rows. In a particularly preferred form, each of the plurality of rows has a series of the wiper blades aligned transverse to the feed direction, the wiper blades in adjacent rows are not in registration such that the wipe light of staggered mounted to each other with respect to the media feed direction.

[0033] In some embodiments, the maintenance drive is reversed such that the wiper member can wipe the elongate array of nozzles in two directions during a maintenance cycle. Preferably the maintenance drive is configured to rotate the tubular chassis at variable speeds. In a further preferred form, the maintenance drive is configured to lift a lower the tubular chassis. Preferably one of the maintenance stations is a printhead capper. In this form, the drive mechanism for lifting and lowering the tubular chassis is independent from the drive mechanism that rotates the tubular chassis.

[0034] Accordingly in a sixth aspect the present invention provides a maintenance facility for an ink jet printer having a pagewidth printhead and a media path for feeding sheets of media substrate in a media feed direction, the pagewidth printhead having an elongate array of nozzles extending the printing width of the media substrate, the maintenance facility comprising:

an elongate chassis for mounting in the printer such that it can rotate about its longitudinal axis; and,

a plurality of maintenance stations mounted to an exterior surface of the elongate chassis; wherein,

the elongate chassis is symmetrical about at least one plane extending through the longitudinal axis.

[0035] By fabricating the elongate chassis so that it has a plane of symmetry through the longitudinal axis, it can be produced by an injection moulding technique. The symmetrical form of the chassis will prevent it from bowing and deforming because of inconsistent shrinkage of the hot polymer material. As the chassis remains straight, the contact pressure between the wiper member and the nozzle face is sufficiently constant to ensure effective cleaning. It will be appreciated that injection moulding of polymer components is very well suited to high-volume, low-cost production.

[0036] The chassis also allows other maintenance stations to be presented to the printhead in quick succession so that the complete maintenance regime is performed quickly. The Applicant has found that the nozzle face can be wiped in the media feed direction to reduce the wiper travel distance without causing colour mixing problems. By firing the nozzles into a blotter or spittoon immediately after being wiped ejects any contaminated ink before it can diffuse into the ink supply lines. This keeps any contamination contained at the nozzles, or perhaps just the chambers holding the ink ejection actuators.

[0037] Preferably, the elongate chassis is symmetrical about at least two planes extending through the longitudinal axis. Preferably the elongate chassis is mounted in the printer such that its longitudinal axis is transverse to the media feed direction. Preferably, at least one of the maintenance stations is paying wiper member for wiping the elongate array of nozzles. Preferably the elongate chassis is formed from an injection moulded polymer. In a particularly preferred form, the elongate chassis has an exterior surface with mounting sites configured to receive any one of the plurality of maintenance stations. Preferably, one of the maintenance stations is a wiper

member for wiping the elongate nozzle array. In a further preferred form, the elongate chassis and the wiper member extend the length of the elongate array of nozzles. In some embodiments, the mounting sites are sockets formed in the elongate chassis. Preferably the tubular chassis has a porous material housed in its central cavity. Preferably each side of the sockets has at least one waste ink capillary for establishing fluid communication between the porous material in the central cavity and the maintenance station mounting to the socket. Conveniently, the mounting formations and the corresponding formations slide into engagement. Optionally the mounting formations and the corresponding formations snap lock together. In some forms, the maintenance stations can mount to different sides of the tubular chassis.

[0038] Preferably the wiper member is mounted to be tubular chassis such that it wipes the the elongate array of nozzles in a direction parallel to the media feed direction. In a particularly preferred form, one of the maintenance stations is a spittoon with an absorbent element for receiving ejected ink. Preferably the absorbent element is in fluid communication with the porous material housed in the central cavity. Preferably the porous material is a porous rigid polymer.

[0039] Preferably the pagewidth printhead has a plurality of printhead ICs, each of the printhead ICs being aligned transverse to the media feed direction. By mounting the printhead ICs in a single line across the printhead, the elongate array of nozzles does not extend far in the direction parallel to the media feed direction. In light of this the length of travel of the wiper member across the printhead is reduced. This makes the wiping operation faster and more easily controlled with respect to be contact pressure on the nozzles. A narrow print zone (in the media feed direction) has other important benefits with regard to the control of the spacing between the nozzles and the media substrate. As these advantages do not directly relate to the maintenance facility, they will not be discussed in detail.

[0040] In particularly preferred embodiments, the wiper member is a plurality of wiper blades formed from resilient material such that a distal edge of each blades flexes when wiping the elongate array of nozzles. Preferably the wiper blades are arranged in parallel rows. In a particularly preferred form, each of the plurality of rows has a series of the wiper blades aligned transverse to the feed direction, the wiper blades in adjacent rows are not in registration such that the wipe light of staggered mounted to each other with respect to the media feed direction.

[0041] In some embodiments, the maintenance drive is reversed such that the wiper member can wipe the elongate array of nozzles in two directions during a maintenance cycle. Preferably the maintenance drive is configured to rotate the tubular chassis at variable speeds. In a further preferred form, the maintenance drive is configured to lift a lower the tubular chassis. Preferably one of the maintenance stations is a printhead capper. In this form, the drive mechanism for lifting and lowering the tubular chassis is independent from the drive mechanism that rotates the tubular chassis.

[0042] Accordingly in a seventh aspect the present invention provides an ink jet printer comprising:

an inkjet printhead having at least one printhead IC for ejecting ink, and the support structure for mounting the ink jet printhead with the printer and supporting the at least one printhead IC, the support structure having a paper guide adjacent the at least one printhead IC;
a print platen for facing the at least one printhead IC during printing to define a gap between the print platen and the at least one printhead IC, the print platen having a guide surface for directing the sheets of print media into the gap; and,
a media feed path extending through the printer along which sheets of media substrate are fed, the media feed path being partially defined by the paper guide on the support structure and the guide surface of the print platen; wherein during use,
the sheets of print media path in sliding contact with the paper guide and spaced from the guide surface during printing.

[0043] Invention uses the paper guide on the printhead support structure to define the gap the nozzles and the surface of the media sheet during printing. However the print platen is in position to direct the leading edge of the sheets towards the downstream drive rollers or other drive mechanism. With minimal contact between the sheets of media and print platen, there is a greatly reduced likelihood of smearing from over sprayed ink during full bleed printing. Furthermore, placing the paper guide on the support structure immediately adjacent the printhead ICs accurately maintains the gap from the nozzles to the media surface.

[0044] Preferably, the ink jet printhead has a plurality of printhead ICs each defining an elongate array of nozzles defined in a nozzle face, the printhead ICs being mounted end to end on the support structure such that they extend transverse to be media feed path, the paper guide being parallel to and equally spaced from each of the printhead ICs. In a further preferred form, the jet printhead is a pagewidth printhead. Preferably the inkjet printhead is provided as a printhead cartridge for user removal and replacement. Preferably, the print platen has a recessed section directly opposite the elongate array of nozzles during printing such that the guide surface is closer to the media feed path than the recessed section. In a particularly preferred form, the recessed section incorporates absorbent material for receiving ink ejected by the printhead ICs. Preferably, the print platen is rotated into position opposite the printhead ICs prior to printing. In some preferred embodiments, the print platen is a maintenance station mounting to a rotating printhead maintenance facility. Preferably the rotating printhead

maintenance facility rotates about an axis extending transverse to the media feed path. In these embodiments, the printhead maintenance facility has a plurality of maintenance stations including a capper, a wiper member, the print platen and a blotter. Preferably the printer further comprises a maintenance drive configured to rotate the printhead maintenance facility and move the printhead maintenance facility towards and away from the inkjet printhead. In particular preferred form, the maintenance drive and rotate the printhead maintenance facility in both directions. In some embodiments the printhead maintenance facility has a tubular chassis the plurality of printhead maintenance stations mounted to the show the exterior. In particularly preferred embodiments, the tubular chassis has porous material in the central cavity, the absorbent material in the recessed section of print platen being in fluid communication with the porous material.

[0045] Preferably, the paper defines a gap between the nozzle face and the surface of the print media that is less than two millimetres. In a further preferred form, the paper defines a gap between the nozzle face and the surface of the print media that is less than one millimetre.

[0046] Accordingly in an eighth the present invention provides a maintenance facility for an inkjet printer, the inkjet printer having a printhead with an array of nozzles defined in a nozzle face, the printhead maintenance facility comprising:

a wiper member having a plurality of blades mounted for movement independent of each other; and,
a maintenance drive for moving the wiper member over the printhead in the media feed direction such that the plurality of blades wipe all the nozzles defined in the nozzle face.

[0047] The invention uses a wiper blade that has been divided into individual blade sections. Each section is capable of moving relative to its adjacent sections so any inconsistencies in the contact force, will not cause buckling or curling in other sections of blade. In this may contact pressure is maintained at the nozzle face is clean effectively.

[0048] Preferably, the printhead is a pagewidth printhead and the array of nozzles extends the width of media substrate printed by the printer, the wiper member also extending the width of media substrate. Preferably the plurality of blades are arranged in parallel rows, each of the rows extending the width of media substrate. In a further preferred form, the blades in one of the parallel rows positioned such that they are not in registration with the blades an adjacent one of the parallel rows. In particularly preferred form, blades in each of the parallel rows are spaced from their adjacent blades by a gap allowing Independent movement of adjacent blades.

[0049] In some embodiments, the maintenance drive is configured to rotate the wiper member about an axis extending transverse to the media feed direction. Preferably the maintenance drive can move the wiper member past the printhead in the media feed direction and opposite the media feed direction. Preferably the maintenance drive can raise and lower the wiper member towards and away from the nozzle face. In some preferred embodiments, the maintenance facility further comprises a tubular chassis, the wiper member being mounted to the tubular chassis exterior. In some embodiments, the maintenance facility further comprises a blotter mounted to the tubular chassis exterior. In a further preferred form, the maintenance facility further comprises a capper and print platen mounted to the tube and the chassis exterior. Preferably the tubular chassis has porous material in central cavity and apertures to establish fluid communication between the wiper member and the porous material. In particular preferred form, the wiper member is a moulded elastomeric element.

[0050] Accordingly in a ninth aspect the present invention provides a printhead maintenance facility for an inkjet printer, the inkjet printer having a printhead with the nozzle face defining an array of nozzles, the printhead maintenance facility comprising:

a wiper member for wiping the nozzle face;
the maintenance drive for moving the wiper member across the array of nozzles in the nozzle face; wherein,
the wiper member has a single blade dimensioned to wipe all the nozzles in a single traverse across the nozzle face.

[0051] A single wiper blade extending the length of the nozzle array is a simple wiping arrangement with low production and assembly costs. In light of this, a single blade wiper is best suited to printers and the lower end of the price range. The higher production volumes demand cost efficient manufacturing techniques and straightforward assembly of the printer components. This may entail some compromise in terms of the operational life of the unit to all the speed and efficiency with which the wiper cleans the printhead. However the single blade design is compact and if it does not effectively clean the nozzle face in a single traverse, the maintenance drive can simply repeat the wiping operation until the printhead is clean.

[0052] Preferably, the printer has a media feed assembly for transporting sheets of media substrate past the printhead in a media feed direction, and the maintenance drive moves the wiper member across the nozzle face in the direction parallel to a media feed direction. In a further preferred form, the printhead is a pagewidth printhead and the single wiper blade extends the length of the nozzle array. Preferably the maintenance drive is configured to move the wiper member in the media feed direction and opposite to the media feed direction. In a particularly preferred form, the maintenance drive is configured to rotate the wiper member about the axis extending transverse to the media feed direction.

[0053] In some embodiments, the printhead maintenance facility further comprises a tubular chassis with a plurality of maintenance stations mounted to the chassis exterior, wherein the wiper member is one of the maintenance stations. Preferably, the chassis exterior has sockets in which the maintenance stations are mounted. In a particularly preferred form, the wiper member is a co-moulded polymer element with a hard plastic base for mounting in the socket, and the single blade being a soft elastomeric material extending from the hard plastic base.

[0054] In some embodiments, the single blade extends normal to the media feed direction. Optionally, the single blade extends at an angle to a line normal to the media feed direction.

[0055] Accordingly in a tenth aspect the present invention provides a printhead maintenance facility for an inkjet printer, the inkjet printer having a printhead with the nozzle face defining an array of nozzles, the printhead maintenance facility comprising:

a wiper member for wiping the nozzle face;
a maintenance drive for moving the wiper member across the array of nozzles in the nozzle face; wherein,
the wiper member has a plurality of parallel blades, each of the plurality of blades being dimensioned to wipe all the nozzles in a single traverse across the nozzle face.

[0056] With multiple parallel blades wiping across the nozzle face, a single traverse by the wiper member will collect more of the dust and contaminants. While a multiple blade design is less compact than a single blade, each wiping operation is quicker and more effective. Hence the printhead can be wiped between pages during the print job and any preliminary maintenance regime performed prior to a print job is completed in a short time.

[0057] Preferably, the printer has a media feed assembly for transporting sheets of media substrate past the printhead in a media feed direction, and the maintenance drive moves the wiper member across the nozzle face in the direction parallel to a media feed direction. In a further preferred form, the printhead is a pagewidth printhead and the plurality of parallel blades extend the length of the nozzle array. Preferably the maintenance drive is configured to move the wiper member in the media feed direction and opposite to the media feed direction. In a particularly preferred form, the maintenance drive is configured to rotate the wiper member about the axis extending transverse to the media feed direction.

[0058] In some embodiments, the printhead maintenance facility further comprises a tubular chassis with a plurality of maintenance stations mounted to the chassis exterior, wherein the wiper member is one of the maintenance stations. Preferably, the chassis exterior has sockets in which the maintenance stations are mounted. In a particularly preferred form, the wiper member is a co-moulded polymer element with a hard plastic base for mounting in the socket, and the plurality of parallel blades are a soft elastomeric material extending from the hard plastic base.

[0059] In some embodiments, the plurality of parallel blades extend normal to the media feed direction. Optionally, the plurality of parallel blades extend at an angle to a line normal to the media feed direction.

[0060] Accordingly in an eleventh aspect the present invention provides a printhead maintenance facility for an inkjet printer, the inkjet printer having a printhead with the nozzle face defining an array of nozzles, the printhead maintenance facility comprising:

a wiper member for wiping the nozzle face;
the maintenance drive for moving the wiper member across the array of nozzles in a wiping direction; wherein,
the wiper member has a single blade extending in a line skew to the wiping direction.

[0061] A single wiper blade is a simple wiping arrangement with low production and assembly costs. Furthermore, by mounting the blade so that it is skew to the wiping direction, the nozzle face will be in contact with only one section of blade and any time during the traverse of the wiper member. With only one section in contact with the nozzle face, the blade does not buckle or curl because of inconsistent contact pressure along its full length. This ensures sufficient contact pressure between the wiper blade and all of the nozzle face without needing to precisely line the blade so that it is completely parallel to the nozzle face. This allows the manufacturing tolerances to be relaxed so that higher volume low-cost production techniques can be employed. This may entail some compromise in terms of increasing the distance that the wiper member must travel in order to clean the printhead, and therefore increasing the time required from each wiping operation. However the reduced manufacturing costs outweigh these potential disadvantages.

[0062] Preferably, the printer has a media feed assembly for transporting sheets of media substrate past the printhead in a media feed direction, and the maintenance drive moves the wiper member across the nozzle face in the direction parallel to a media feed direction. In a further preferred form, the printhead is a pagewidth printhead and the single blade is longer than the length of the nozzle array. Preferably the maintenance drive is configured to move the wiper member in the media feed direction and opposite to the media feed direction. In a particularly preferred form, the maintenance drive is configured to rotate the wiper member about the axis extending transverse to the media feed direction.

[0063] In some embodiments, the printhead maintenance facility further comprises a tubular chassis with a plurality of maintenance stations mounted to the chassis exterior, wherein the wiper member is one of the maintenance stations. Preferably, the chassis exterior has

sockets in which the maintenance stations are mounted. In a particularly preferred form, the wiper member is a co-moulded polymer element with a hard plastic base for mounting in the socket, and the single blade is a soft elastomeric material extending from the hard plastic base.

[0064] Preferably, the maintenance drive is configured to move the wiper member across the nozzle face at variable speeds. In a further preferred form, the maintenance drive is configured to lift and lower the wiper member. Preferably, the maintenance drive has a rotating drive mechanism for rotating the wiper member, and the lift drive mechanism for lifting and lowering the wiper member, the rotating drive mechanism being independently operable from the lift drive mechanism.

[0065] Accordingly in a twelfth aspect the present invention provides a printhead maintenance facility for an inkjet printer, the inkjet printer having a printhead with the nozzle face defining an array of nozzles, the printhead maintenance facility comprising:

a wiper member for wiping the nozzle face;
a maintenance drive for moving the wiper member across the array of nozzles in a wiping direction; wherein,
the wiper member has a plurality of blades for wiping contact with the nozzle face, each of the plurality of blades being skew to the wiping direction and positioned such that each one wipes a corresponding portion of the array of nozzles.

[0066] By mounting the wiper blade so that it is skew to the wiping direction, the nozzle face will be in contact with only one section of blade and any time during the traverse of the wiper member. With only one section in contact with the nozzle face, the blade does not buckle or curl because of inconsistent contact pressure along its full length. This ensures sufficient contact pressure between the wiper blade and all of the nozzle face without needing to align the blade so that it is precisely parallel to the nozzle face. This allows the manufacturing tolerances to be relaxed so that high volume low-cost production techniques can be employed. A single skew blade will achieve this but it will increase the distance that the wiper member must travel in order to clean the printhead, and therefore increasing the time required from each wiping operation. In light of this, the invention uses a series of adjacent skew blades, each individual blade wiping a corresponding portion of the nozzle array. Multiple blades involve higher manufacturing costs than a single blade but in certain applications, the compact design and quicker operation outweigh these potential disadvantages.

[0067] Preferably, the plurality of blades are parallel. Preferably the portion of the array of nozzles wiped by one of the plurality of blades overlaps with the corresponding portion one by an edge of blade. Preferably, the printer has a media feed assembly for transporting sheets of media substrate past the printhead in a media feed direction, and the maintenance drive moves the wiper member across the nozzle face in the direction parallel to a media feed direction. In a further preferred form, the printhead is a pagewidth printhead and the multiple blades extend the length of the nozzle array. Preferably the maintenance drive is configured to move the wiper member in the media feed direction and opposite to the media feed direction. In a particularly preferred form, the maintenance drive is configured to rotate the wiper member about the axis extending transverse to the media feed direction.

[0068] In some embodiments, the printhead maintenance facility further comprises a tubular chassis with a plurality of maintenance stations mounted to the chassis exterior, wherein the wiper member is one of the maintenance stations. Preferably, the chassis exterior has sockets in which the maintenance stations are mounted. In a particularly preferred form, the wiper member is a co-moulded polymer element with a hard plastic base for mounting in the socket, and the multiple blades are a soft elastomeric material extending from the hard plastic base.

[0069] Preferably, the maintenance drive is configured to move the wiper member across the nozzle face at variable speeds. In a further preferred form, the maintenance drive is configured to lift and lower the wiper member. Preferably, the maintenance drive has a rotating drive mechanism for rotating the wiper member, and the lift drive mechanism for lifting and lowering the wiper member, the rotating drive mechanism being independently operable from the lift drive mechanism.

[0070] Accordingly in a thirteenth aspect the present invention provides a maintenance facility for an inkjet printer, the inkjet printer having a printhead with an array of nozzles defined in a nozzle face, the printhead maintenance facility comprising:

a wiper member having an array of contact pads mounted for movement independent of each other; and,
a maintenance drive for moving the wiper member over the printhead in the media feed direction such that the array of contact pads wipe all the nozzles defined in the nozzle face.

[0071] The invention uses a wiping surface that has been divided into an array of individual contact pads. Each pad is capable of moving relative to its adjacent pads so any inconsistencies in the contact force will vary the amount each pad compresses and deforms individually. Relatively high compression of one pad will not necessarily transfer compressive forces to its adjacent pad. In this way contact pressure is maintained at the nozzle face is clean effectively.

[0072] Preferably, the printhead is a pagewidth printhead and the array of nozzles extends the width of media substrate printed by the printer, the wiper member also

extending the width of media substrate. Preferably the array of pads is arranged in parallel rows, each of the rows extending the width of media substrate. In a further preferred form, the pads in one of the parallel rows positioned such that they are not in registration with the pads an adjacent one of the parallel rows. In particularly preferred form, pads in each of the parallel rows are spaced from their adjacent pads by a gap allowing independent movement of adjacent pads.

[0073] In some embodiments, the maintenance drive is configured to rotate the wiper member about an axis extending transverse to the media feed direction. Preferably the maintenance drive can move the wiper member past the printhead in the media feed direction and opposite the media feed direction. Preferably the maintenance drive can raise and lower the wiper member towards and away from the nozzle face. In some preferred embodiments, the maintenance facility further comprises a tubular chassis, the wiper member being mounted to the tubular chassis exterior. In some embodiments, the maintenance facility further comprises a blotter mounted to the tubular chassis exterior. In a further preferred form, the maintenance facility further comprises a capper and print platen mounted to the tube and the chassis exterior. Preferably the tubular chassis has porous material in central cavity and apertures to establish fluid communication between the wiper member and the porous material.

[0074] Preferably, the chassis exterior has sockets in which the maintenance stations are mounted. In a particularly preferred form, the wiper member is a co-moulded polymer element with a hard plastic base for mounting in the socket, and the array of pads are a soft elastomeric material extending from the hard plastic base. In a particularly preferred form, the pads are cylindrical with the diameter of the cylinder being substantially longer than the axis of the cylinder.

[0075] Accordingly in a fourteenth aspect the present invention provides a maintenance facility for an inkjet printer, the inkjet printer having a printhead with an array of nozzles defined in a nozzle face and media feed assembly for moving sheets of print media past the printhead in a media feed direction, the printhead maintenance facility comprising:

a wiper member having a contact surface for wiping the nozzle face; and,

a maintenance drive for moving the wiper member over the printhead in a direction parallel to the media feed direction; wherein,

the contact surface has a nonlinear configuration such that during a wiping operation the contact surface will have two sections simultaneously in contact with the nozzle face.

[0076] The invention uses a wiping surface that has an angled or curved shape so that the majority of the nozzle face is wiped with a wiper section that is inclined to the media feed direction while reducing the length of travel of the wiper member relative to the printhead. The ordinary worker will understand that the contact blade can have a shallow V-shape war U-shape.

[0077] Preferably, the contact surface is a wiper blade. Preferably, the contact blade has a U-shaped consideration. Optionally the contact blade has a U-shaped configuration. In some forms the V-shaped contact blade wipes the nozzle face with its apex first. In the U-shaped configuration, it is preferable if the contact blade wipes over the nozzle face with its curved section first. Preferably, the printhead is a pagewidth printhead and the array of nozzles extends the width of media substrate printed by the printer, the wiper member also extending the width of media substrate.

[0078] In some embodiments, the maintenance drive is configured to rotate the wiper member about an axis extending transverse to the media feed direction. Preferably the maintenance drive can move the wiper member past the printhead in the media feed direction and opposite the media feed direction. Preferably the maintenance drive can raise and lower the wiper member towards and away from the nozzle face. In some preferred embodiments, the maintenance facility further comprises a tubular chassis, the wiper member being mounted to the tubular chassis exterior. In some embodiments, the maintenance facility further comprises a blotter mounted to the tubular chassis exterior. In a further preferred form, the maintenance facility further comprises a capper and print platen mounted to the tube and the chassis exterior. Preferably the tubular chassis has porous material in central cavity and apertures to establish fluid communication between the wiper member and the porous material.

[0079] Preferably, the chassis exterior has sockets in which the maintenance stations are mounted. In a particularly preferred form, the wiper member is a co-moulded polymer element with a hard plastic base for mounting in the socket, and the wiper blade is a soft elastomeric material extending from the hard plastic base.

[0080] Accordingly in a fifteenth aspect the present invention provides a maintenance facility for an inkjet printer, the inkjet printer having a printhead with an array of nozzles defined in a nozzle face and media feed assembly for moving sheets of print media past the printhead in a media feed direction, the printhead maintenance facility comprising:

a wiper member having a contact blade for wiping the nozzle face; and,

a maintenance drive for moving the wiper member over the printhead in a direction parallel to the media feed direction; wherein,

the contact blade has a nonlinear configuration such that during a wiping operation the contact surface has multiple sections simultaneously contacting the nozzle face.

[0081] The invention uses a wiping blade that has a zigzag or sinusoidal shape so that the nozzle face is

wiped with a number wiper sections that are inclined to the media feed direction. This configuration also keeps the length of travel of the wiper member relative to the printhead small enough to remain accurate and compact.

[0082] Preferably, the contact blade has a zigzag configuration. Optionally the contact blade has a sinusoidal configuration. In some forms, the wiper member is elongate and extend transverse to the media feed direction. Preferably, the printhead is a pagewidth printhead and the array of nozzles extends the width of media substrate printed by the printer, the wiper member also extending the width of media substrate.

[0083] In some embodiments, the maintenance drive is configured to rotate the wiper member about an axis extending transverse to the media feed direction. Preferably the maintenance drive can move the wiper member past the printhead in the media feed direction and opposite the media feed direction. Preferably the maintenance drive can raise and lower the wiper member towards and away from the nozzle face. In some preferred embodiments, the maintenance facility further comprises a tubular chassis, the wiper member being mounted to the tubular chassis exterior. In some embodiments, the maintenance facility further comprises a blotter mounted to the tubular chassis exterior. In a further preferred form, the maintenance facility further comprises a capper and print platen mounted to the tube and the chassis exterior. Preferably the tubular chassis has porous material in central cavity and apertures to establish fluid communication between the wiper member and the porous material.

[0084] Preferably, the chassis exterior has sockets in which the maintenance stations are mounted. In a particularly preferred form, the wiper member is a co-moulded polymer element with a hard plastic base for mounting in the socket, and the wiper blade is a soft elastomeric material extending from the hard plastic base.

[0085] Accordingly in a sixteenth aspect the present invention provides a maintenance facility for an inkjet printer, the inkjet printer having a printhead with an array of nozzles defined in a nozzle face and media feed assembly for moving sheets of print media along a media feed path extending past the printhead in a media feed direction, the printhead maintenance facility comprising:

a wiper member having a fibrous pad for wiping the nozzle face; and,

a maintenance drive for moving the wiper member over the printhead in a direction parallel to the media feed direction; wherein during use,

the maintenance drive moves the fibrous pad through the media feed path in order to contact the nozzle face.

[0086] A fibrous pad is particularly effective for wiping the nozzle face. The pad presents many points of contact for touching the nozzle face so that the fibres can mechanically engage with solid contaminants and will wick away liquid contaminants like ink floods and so on. However once the fibrous pad has cleaned the nozzle face, it is difficult to remove the contaminants from the fibrous pad. After a large number of wiping operations, the fibrous pad can be heavily laden with contaminants and may no longer clean the nozzle face effectively. However, printers intended to have a short operational life, or printers that allow the wiper to be replaced, a fibrous pad will offer the most effective wiper.

[0087] Preferably the fibrous pad has a woven material with strands less than two denier. In a further preferred form the woven material has strands less than one denier. In a particularly preferred form the woven material is a polyester/polyamide blend. In some embodiments the woven material is a microfiber material. Preferably, the printhead is a pagewidth printhead and the array of nozzles extends the width of media substrate printed by the printer, the wiper member also extending the width of media substrate.

[0088] In some embodiments, the maintenance drive is configured to rotate the wiper member about an axis extending transverse to the media feed direction. Preferably the maintenance drive can move the wiper member past the printhead in the media feed direction and opposite the media feed direction. Preferably the maintenance drive can raise and lower the wiper member towards and away from the nozzle face. In some preferred embodiments, the maintenance facility further comprises a tubular chassis, the wiper member being mounted to the tubular chassis exterior. In some embodiments, the maintenance facility further comprises a blotter mounted to the tubular chassis exterior. In a further preferred form, the maintenance facility further comprises a capper and print platen mounted to the tube and the chassis exterior. Preferably the tubular chassis has porous material in central cavity and apertures to establish fluid communication between the wiper member and the porous material.

[0089] Preferably, the chassis exterior has sockets in which the maintenance stations are mounted. In a particularly preferred form, the wiper member is removably the mounted in the socket, such that the user can remove and replace the wiper member after prolonged use.

[0090] Accordingly in a seventeenth aspect the present invention provides a printhead cartridge for an inkjet printer, inkjet printer having a ink reservoir for supplying ink to the printhead cartridge and waste ink outlet for receiving ink from the printhead cartridge; the printhead cartridge comprising:

cartridge body configured the user insertion and removal from the ink jet printer;

pagewidth printhead and the cartridge body, the pagewidth printhead defining an array of nozzles for ejecting ink onto a media substrate;

a first fluid coupling for fluid communication between the pagewidth printhead and the ink reservoir; and,

a second fluid coupling for fluid communication between the pagewidth printhead and the waste ink outlet; wherein during use,

the first and second fluid couplings establish fluid communication with the ink tank and the waste ink outlet respectively, upon insertion of the cartridge body in the inkjet printer.

[0091] This recognizes that individual ink ejection nozzles may fail over time and eventually there are enough dead nozzles to cause artifacts in the printed image. Providing pagewidth printhead is a user removable cartridge allows the user to periodically replace the printhead and hence maintain the print quality without replacing the entire printer.

[0092] Preferably the first fluid coupling has an interface plate supporting a plurality of spouts positioned for sealed engagement with corresponding apertures in a complementary socket on the printer in order to establish fluid communication with a corresponding plurality of ink tanks containing different types of ink such that each of the plurality of spouts is supplied with one of the different types of ink respectively. In a further preferred form the interface plate has surface formations individually associated with each of the spouts respectively, the surface formations defining preferred flow path along the interface plate for any residual ink draining away from the spouts under gravity, the preferred flow paths being configured to avoid any other spouts. In particular preferred forms, the surface formations are the grooves in the interface plate. In a further preferred form, the spouts are arranged in a circular formation on the interface plate. Preferably, the grooves extend in a generally vertical direction when the printhead cartridge is oriented as will be when installed, the grooves deviating from generally vertical to avoid one of the spouts of a different ink type.

[0093] Preferably, each of the spouts have an end formation configured to engage the shut off valve in the complementary socket on the printer, the end formation being configured to open the shut off valve upon installation of the printhead cartridge in the printer. In a particularly preferred form, each of the spouts have at least one aperture in a side wall for establishing fluid communication with the pagewidth printhead.

[0094] Preferably, the cartridge body has an elongate structure with a plurality of longitudinally extending channels, each of the longitudinally extending channels being for one of the different types of ink supply to the printhead by the respective spouts of the first fluid coupling. In particular preferred form, the pagewidth printhead has a plurality of printhead ICs mounted to the elongate structure such that the printhead ICs are aligned with each other and the longitudinal extent of the longitudinally extending channels. Optionally, the elongate structure has a series of fine conduits extending from each of the longitudinally extending channels to the printhead ICs.

[0095] In particular preferred form, the second fluid coupling is structurally under an image of the first fluid coupling. Preferably the first fluid coupling is positioned at one end of the elongate structure and the second fluid coupling is positioned at the opposite end of the elongate structure such that the spouts of the first and second fluid couplings are in fluid communication with the respective ends of the corresponding longitudinally extending channels.

[0096] Accordingly in an eighteenth aspect the present invention provides an inkjet printer comprising:

a printhead cartridge having a pagewidth printhead defining an array of nozzles for ejecting ink onto a media substrate, the printhead cartridge having a fluid coupling in fluid communication with the array of nozzles;
the cradle for supporting the printhead cartridge such that the array of nozzles is adjacent a media feed path extending through the printer, the cradle having a latch mechanism for retaining the printhead cartridge;
an ink reservoir for containing supply of ink; and,
a complementary coupling for fluid communication with the ink reservoir; wherein,
the fluid coupling and the complementary coupling are configured to establish a sealed fluid connection using mechanical advantage provided by user actuation of the latch mechanism to retain the printhead cartridge in the cradle.

[0097] The linking the operation of the latch mechanism to the fluid coupling between the ink reservoir and the printhead cartridge, the sealed fluid connection is formed with the assistance of mechanical advantage. The latch can be configured so that the coupling between the printhead and the ink supply is in essence the zero insertion force coupling. Furthermore with the fluid connection made while the printhead cartridge is supported by the cradle, the cartridge structure is not subjected to damaging stresses.

[0098] Preferably, the complementary coupling is movable between a disengaged position that is retracted clear of the fluid coupling, and an engaged position in contact with the fluid coupling. Preferably, the fluid coupling has at least one first conduit and the complementary coupling has at least one second conduit, the second conduit having a seal seat and a compression member that is movable relative to the seal seat, and an annular seal positioned in the seal seat such that user actuation of the latch mechanism to retain the printhead cartridge in the cradle, forces the compression member to compress the annular seal against the seal seat to create a fluid seal with the first conduit. Preferably, the second conduit telescopically engages first conduit when the complementary coupling is moved from the disengaged position to the engaged position such that engaged position the annular seal is compressed to create a fluid seal. Preferably, the mechanical advantage provided by user actuation of the latch mechanism, is leverage generated by a lever system linking the latch mechanism and the compression member. Conveniently, the lever system completely disengages the second conduit from the

first conduit when it moves the second conduit to the disengaged position.

[0099] Preferably, the annular seal is a ring of resilient material. In a particularly preferred form the ring of resilient material has a radial cross sectional shape with at least one straight side when the pressed, and said at least one straight side bulging to a curved shape when compressed.

[0100] Preferably, the fluid coupling has a plurality of first conduits and the corresponding coupling has a corresponding plurality of second conduits, and the lever system actuates to simultaneously engage and disengage the plurality of first second conduits. In a further preferred form the annular seals for each of the second conduits are arranged such that they are all compressed by the compression member simultaneously. Conveniently, the second conduits are formed in an arrangement with a geometric centroid at which the lever system connects to the compression member. In a particularly preferred form, the second conduits are arranged in a circle and the lever system connects to the centre of the circle.

[0101] Preferably the fluid coupling has an interface plate supporting the plurality of first conduits, each of the first conduits positioned for sealed engagement with a corresponding plurality of ink tanks containing different types of ink. In a further preferred form, the first conduits are each spouts extending from an interface plate for mounting the spouts in a configuration matching the arrangement of the second conduits. In some embodiments, the interface plate has surface formations individually associated with each of the spouts respectively, the surface formations defining preferred flow path along the interface plate for any residual ink draining away from the spouts under gravity, the preferred flow paths being configured to avoid any other spouts. In particular preferred forms, the surface formations are the grooves in the interface plate. In a further preferred form, the spouts are arranged in a circular formation on the interface plate. Preferably, the grooves extend in a generally vertical direction when the printhead cartridge is oriented as will be when installed, the grooves deviating from generally vertical to avoid one of the spouts of a different ink type.

[0102] Preferably, each of the spouts have an end formation configured to engage the shut off valve in the complementary socket on the printer, the end formation being configured to open the shut off valve upon installation of the printhead cartridge in the printer. In a particularly preferred form, each of the spouts have at least one aperture in a side wall for establishing fluid communication with the pagewidth printhead.

[0103] Preferably, the cartridge body has an elongate structure with a plurality of longitudinally extending channels, each of the longitudinally extending channels being for one of the different types of ink supply to the printhead by the respective spouts of the first fluid coupling. In particular preferred form, the pagewidth printhead has a plurality of printhead ICs mounted to the elongate structure such that the printhead ICs are aligned with each other and the longitudinal extent of the longitudinally extending channels. Optionally, the elongate structure has a series of fine conduits extending from each of the longitudinally extending channels to the printhead ICs.

[0104] In particular preferred form, the fluid coupling is a first fluid coupling and the printhead cartridge further comprises a second fluid coupling, the second fluid coupling being a mirror image of the first fluid coupling, the second fluid coupling configured for fluid communication with a waste ink outlet in the printer. Preferably the first fluid coupling is positioned at one end of the elongate structure and the second fluid coupling is positioned at the opposite end of the elongate structure such that the spouts of the first and second fluid couplings are in fluid communication with the respective ends of the corresponding longitudinally extending channels.

[0105] Accordingly in a nineteenth aspect the present invention provides a printhead cartridge for an inkjet printer, the inkjet printer defining a paper path for sheets of media substrate, the printhead cartridge comprising:

a cartridge body configured for user insertion in, and removal from an inkjet printer such that during printing, the cartridge remains stationary relative to the paper path; and,

a printhead having a plurality of printhead ICs each defining an array of nozzles for ejecting ink on to the sheets of media substrate; wherein,

the printhead is mounted to the cartridge body such that when the printhead cartridge is installed in the printer, the array of nozzles are adjacent a planar section of the paper path, and no part of the printhead cartridge extends into the plane encompassing the planar section of the paper path.

[0106] Producing the printhead cartridge so that it does not extend into the plane of the paper path, allows to be used with several like printhead cartridges in a wide format printer, or indeed any printer using a printhead that is longer than the printhead cartridge. It is important to note that invention is directed to the printhead cartridge that is configured for user removal and installation, rather than a printhead module which is assembled into the printer at the factory.

[0107] Preferably, the printhead cartridge further comprises a first fluid coupling for connection to an ink reservoir in the printer. In a further preferred form, the printhead cartridge further comprises a second fluid coupling the connection to a waste ink outlet in the printer. Preferably, the first and second fluid couplings each having at least one conduit extending parallel to the planar section of the paper path.

[0108] Preferably the first fluid coupling has an interface plate supporting a plurality of spouts positioned for sealed engagement with corresponding apertures in a complementary socket on the printer in order to establish fluid communication with a corresponding plurality of ink tanks containing different types of ink such that each of

the plurality of spouts is supplied with one of the different types of ink respectively. In a further preferred form the interface plate has surface formations individually associated with each of the spouts respectively, the surface formations defining preferred flow path along the interface plate for any residual ink draining away from the spouts under gravity, the preferred flow paths being configured to avoid any other spouts. In particular preferred forms, the surface formations are the grooves in the interface plate. In a further preferred form, the spouts are arranged in a circular formation on the interface plate. Preferably, the grooves extend in a generally vertical direction when the printhead cartridge is oriented as will be when installed, the grooves deviating from generally vertical to avoid one of the spouts of a different ink type.

[0109] Preferably, each of the spouts have an end formation configured to engage the shut off valve in the complementary socket on the printer, the end formation being configured to open the shut off valve upon installation of the printhead cartridge in the printer. In a particularly preferred form, each of the spouts have at least one aperture in a side wall for establishing fluid communication with the pagewidth printhead.

[0110] Preferably, the cartridge body has an elongate structure with a plurality of longitudinally extending channels, each of the longitudinally extending channels being for one of the different types of ink supply to the printhead by the respective spouts of the first fluid coupling. In particular preferred form, the plurality of printhead ICs mounted to the elongate structure such that the printhead ICs are aligned with each other and the longitudinal extent of the longitudinally extending channels. Optionally, the elongate structure has a series of fine conduits extending from each of the longitudinally extending channels to the printhead ICs.

[0111] In particularly preferred form, the second fluid coupling is structurally a mirror image of the first fluid coupling. Preferably the first fluid coupling is positioned at one end of the elongate structure and the second fluid coupling is positioned at the opposite end of the elongate structure such that the spouts of the first and second fluid couplings are in fluid communication with the respective ends of the corresponding longitudinally extending channels.

[0112] Accordingly in a twentieth aspect the present invention provides a printhead maintenance facility for an inkjet printer having a pagewidth printhead and a media path for feeding sheets of media substrate in a media feed direction, the pagewidth printhead having an elongate array of nozzles extending the printing width of the media substrate, the printhead maintenance facility comprising:

an inner chassis for mounting in the printer such that it can rotate about its longitudinal axis;

an outer chassis mounted to the inner chassis, the outer chassis having a plurality of maintenance station mounting sites; and,

a plurality of maintenance stations mounted to the outer chassis.

[0113] By using an inner and outer chassis, the different chassis structures can be designed specifically for different purposes. In particular, the inner chassis can be designed solely for the provision of structural rigidity and accurately positioning the maintenance stations relative to their printhead. The outer chassis can be designed specifically for accurately mounting the maintenance stations in an interchangeable manner. While a single chassis may well be able to satisfy both objectives, the cost in terms of materials and machining would make it impractical.

[0114] Preferably, the outer chassis mounts to the inner chassis by feeding over the exterior of the inner chassis with an interference fit. In a further preferred form, the outer chassis has a plurality of interengageable components that couple together to compressively hold the inner chassis exterior.

[0115] Preferably, the inner chassis is a tubular chassis. In a further preferred form, the tubular chassis is a metal extrusion. Preferably, the outer chassis is an assembly of separate metal mouldings that inter-engage with each other via complimentary formations integrally formed on each of the metal mouldings. Optionally, the complimentary formations provide a bayonet type coupling, such that longitudinal movement of the separate metal mouldings relative to each other engage or disengage the coupling. Conveniently, the inner and outer chassis are formed from aluminium. Optionally, the inner chassis is an extruded steel tube. In a particularly preferred form, one of the maintenance stations is a wiper member for wiping the elongate nozzle array of the printhead. In a particularly preferred form a printhead maintenance facility further comprises a maintenance drive connected to the inner chassis for rotating it about its longitudinal axis.

[0116] Preferably, the tubular chassis is mounted in the printer such that its longitudinal axis is transverse to the media feed direction. Preferably the outer chassis has a generally rectangular cross section. Preferably a porous material housed in a cavity between the inner and outer chassis.

[0117] Preferably the wiper member is mounted to the outer chassis such that it wipes the elongate array of nozzles in a direction parallel to the media feed direction. In a particularly preferred form, one of the maintenance stations is a spittoon with an absorbent element for receiving ejected ink. Preferably the absorbent element is in fluid communication with the porous material housed in the central cavity. Preferably the porous material is a porous rigid polymer.

[0118] Preferably the pagewidth printhead has a plurality of printhead ICs, each of the printhead ICs being aligned transverse to the media feed direction. By mounting the printhead ICs in a single line across the printhead, the elongate array of nozzles does not extend far in the

direction parallel to the media feed direction. In light of this the length of travel of the wiper member across the printhead is reduced. This makes the wiping operation faster and more easily controlled with respect to be contact pressure on the nozzles.

[0119] In particularly preferred embodiments, the wiper member is a plurality of wiper blades formed from resilient material such that a distal edge of each blades flexes when wiping the elongate array of nozzles. Preferably the wiper blades are arranged in parallel rows. In a particularly preferred form, each of the plurality of rows has a series of the wiper blades aligned transverse to the feed direction, the wiper blades in adjacent rows are not in registration such that caps between the wiper blades in one of rows are wiped by the wiper blades in the adjacent row.

[0120] In some embodiments, the maintenance drive is reversible such that the wiper member can wipe the elongate array of nozzles in two directions during a maintenance cycle. Preferably the maintenance drive is configured to rotate the tubular chassis at variable speeds. In a further preferred form, the maintenance drive is configured to lift a lower the tubular chassis. Preferably one of the maintenance stations is a printhead capper. In this form, the drive mechanism for lifting and lowering the tubular chassis is independent from the drive mechanism that rotates the tubular chassis.

[0121] Accordingly in a twenty first aspect the present invention provides a printhead maintenance facility for an inkjet printer having a pagewidth printhead and a media path for feeding sheets of media substrate in a media feed direction, the pagewidth printhead having a nozzle face defining an elongate array of nozzles extending the printing width of the media substrate, the printhead maintenance facility comprising:

a wiper member extending the length of the nozzle array;
an absorbent pad extending the length of the wiper member; and,
a maintenance drive for moving the wiper member such that it wipes the array of nozzles and subsequently wipes the absorbent pad.

[0122] Moving the wiper member across the absorbent pad after it wipes the nozzle array cleans the wiper member and prevents the build up of contaminants. By making the absorbent pad as long as the wiper member itself, it cleans the wiper member quickly and more effectively. The volume of the pad is greater than a shorter pad that would need to be drawn over the length of the wiper member in order to clean. With a greater volume, the pad can absorb more ink and can disburse the dust over a wider surface area. Accordingly the absorbent pad can be changed less frequently.

[0123] Preferably, the absorbent pad has a cleaning surface which contacts the wiper member, the contact surface being covered with a woven material having stranded less than two deniers. In a further preferred form, the woven material is a blend of polyester and polyamide. In a particularly preferred embodiment the woven material is microfibre. In some embodiments, the absorbent pad has a foam core.

[0124] Preferably, the maintenance drive is configured to rotate the wiper member about an axis extending transverse to the media feed direction such that the wiper member moves in a circular arc. In a further preferred form, the nozzle face and the absorbent pad are positioned on the circular arc. In a particularly preferred form the contact surface of the absorbent pad is curved to correspond with the circular arc. Preferably the circular arc is parallel to the media feed direction at the nozzle face.

[0125] Preferably the wiper member has a resilient blade with the distal edge configured to flex upon contact with the nozzle face. In a further preferred form the printhead maintenance facility further comprises a doctor blade positioned on the circular arc, which extends transverse to the media feed direction, wherein during use the maintenance drive moves the wiper member over the nozzle face and then past the doctor blade such that the resilient blade flexes in order to pass the doctor blade and upon disengagement of the resilient blade and the doctor blade, the resilient blade flicks back to its quiescent shape thereby flinging contaminants off its surface. In a particularly preferred form, the resilient blade of the wiper member engages the doctor blade prior to engaging the absorbent pad.

[0126] In some embodiments, the wiper member has a plurality of blades mounted for movement independent of each other. In this aspect, the blade has been divided into individual blade sections. Each section is capable of moving relative to its adjacent sections so any inconsistencies in the contact force, will not cause buckling or curling in other sections of blade. In this may contact pressure is maintained at the nozzle face is clean effectively.

[0127] Preferably, the plurality of blades are arranged in parallel rows, each of the rows extending the width of media substrate. In a further preferred form, the blades in one of the parallel rows positioned such that they are not in registration with the blades in an adjacent one of the parallel rows. In particularly preferred form, the blades in each of the parallel rows are spaced from their adjacent blades by a gap allowing Independent movement of adjacent blades.

[0128] Preferably the maintenance drive can raise and lower the wiper member towards and away from the nozzle face. In some preferred embodiments, the maintenance facility further comprises a tubular chassis, the wiper member being mounted to the tubular chassis exterior. In some embodiments, the maintenance facility further comprises a blotter mounted to the tubular chassis exterior. In a further preferred form, the maintenance facility further comprises a capper and print platen mounted to the tube and the chassis exterior. Preferably the tubular

chassis has porous material in central cavity and apertures to establish fluid communication between the wiper member and the porous material. In particular preferred form, the wiper member is a moulded elastomeric element.

[0129] Preferably, the inner chassis is a tubular chassis. In a further preferred form, the tubular chassis is a metal extrusion. Preferably, the outer chassis is an assembly of separate metal mouldings that inter-engage with each other via complimentary formations integrally formed on each of the metal mouldings. Optionally, the complimentary formations provide a bayonet type coupling, such that longitudinal movement of the separate metal mouldings relative to each other engage or disengage the coupling. Conveniently, the inner and outer chassis are formed from aluminium. Optionally, the inner chassis is an extruded steel tube. In a particularly preferred form, the wiper member is one of the maintenance stations

[0130] In a particularly preferred form, one of the maintenance stations is a spittoon with an absorbent element for receiving ejected ink. Preferably the absorbent element is in fluid communication with the porous material housed in the central cavity. Preferably the porous material is a porous rigid polymer.

[0131] Preferably the pagewidth printhead has a plurality of printhead ICs, each of the printhead ICs being aligned transverse to the media feed direction. By mounting the printhead ICs in a single line across the printhead, the elongate array of nozzles does not extend far in the direction parallel to the media feed direction. In light of this the length of travel of the wiper member across the printhead is reduced. This makes the wiping operation faster and more easily controlled with respect to be contact pressure on the nozzles.

[0132] Preferably one of the maintenance stations is a printhead capper. In this form, the drive mechanism for lifting and lowering the tubular chassis is independent from the drive mechanism that rotates the tubular chassis.

[0133] Accordingly in a twenty second aspect the present invention provides a printhead maintenance facility for an inkjet printer having a pagewidth printhead and a media path for feeding sheets of media substrate in a media feed direction, the pagewidth printhead having a nozzle face defining an elongate array of nozzles extending the printing width of the media substrate, the printhead maintenance facility comprising:

a wiper member extending the length of the nozzle array;

the chassis for supporting the wiper member; and,

a maintenance drive for moving the wiper member towards, and away from, the nozzle face, the maintenance drive being configured to apply a moving force to the chassis at a first bearing point proximate one end of the wiper member, and configured to apply an equal moving force to the chassis at a second bearing point proximate the other end of the wiper member; wherein,

the first bearing point and the second bearing point are equidistant from a longitudinal mid-point of the wiper member.

[0134] Rigidly supporting the wiper member with the chassis and applying drive forces to the chassis in a symmetrical manner significantly reduce inconsistencies in the contact pressure between the wiper member and the nozzle face.

[0135] Preferably, the maintenance drive has a first arm engaging the first bearing point and a second arm engaging the second bearing point, the maintenance drive also having a first cam and a second cam, the first cam engaging the first arm and the second cam engaging the second arm, the first and second cam is being mounted for rotation on a common shaft. In a further preferred form, the maintenance drive has a first actuator for rotating the chassis about an axis extending transverse to the media feed direction. In a particularly preferred form, the maintenance drive has a second actuator for rotating the common shaft such that the first actuator and the second actuator can operate independently. Conveniently, the first actuator and the second actuator are both electric motors with encoder disks providing feedback to a print engine controller in the inkjet printer.

[0136] Preferably, the wiper member has a plurality of resilient blades extending the width of media substrate. Preferably the plurality of blades are arranged in parallel rows, each of the rows extending the width of media substrate. In a further preferred form, the blades in one of the parallel rows positioned such that they are not in registration with the blades an adjacent one of the parallel rows. In particularly preferred form, blades in each of the parallel rows are spaced from their adjacent blades by a gap allowing independent movement of adjacent blades.

[0137] In some embodiments, the maintenance drive is configured to move the wiper member past the printhead in the media feed direction and opposite the media feed direction. Preferably the chassis is a tubular chassis, the wiper member being mounted to the tubular chassis exterior. In some embodiments, the maintenance facility further comprises a blotter mounted to the tubular chassis exterior. In a further preferred form, the maintenance facility further comprises a capper and print platen mounted to the tube and the chassis exterior. Preferably the tubular chassis has porous material in central cavity and apertures to establish fluid communication between the wiper member and the porous material. In particular preferred form, the wiper member is a moulded elastomeric element.

[0138] Preferably, the printhead maintenance facility further comprises an absorbent pad extending the length of the wiper member such that the maintenance drive moves the wiper member across the absorbent pad after the wiper member has wiped the nozzle face. Preferably, the absorbent pad has a cleaning surface which contacts

the wiper member, the contact surface being covered with a woven material having stranded less than two deniers. In a further preferred form, the woven material is a blend of polyester and polyamide. In a particularly preferred embodiment the woven material is microfibre. In some embodiments, the absorbent pad has a foam core.

[0139] In a further preferred form the printhead maintenance facility further comprises a doctor blade extending transverse to the media feed direction, wherein during use the maintenance drive moves the wiper member over the nozzle face, then across the absorbent pad and then past the doctor blade such that the resilient blade flexes in order to pass the doctor blade and upon disengagement of the resilient blade and the doctor blade, the resilient blade flicks back to its quiescent shape thereby flinging contaminants off its surface.

[0140] Accordingly in a twenty third aspect the present invention provides a printhead maintenance facility for an inkjet printer having a pagewidth printhead and a media path for feeding sheets of media substrate in a media feed direction, the pagewidth printhead having a nozzle face defining an elongate array of nozzles extending the printing width of the media substrate, the printhead maintenance facility comprising:

a wiper member extending the length of the nozzle array;
a chassis for supporting the wiper member; and,
a maintenance drive has a first actuator for moving the wiper member towards or away from the nozzle face, and a second actuator for rotating wiper member about an axis extending transverse to the media feed direction; wherein,
the first actuator and the second actuator are independently operable.

[0141] The ability to independently operate the different drives within the maintenance facility gives the user a wide range of cleaning options. The versatility provided by separate independent drives allows the maintenance regime can focus on the maintenance problems that are currently relevant while skipping any maintenance procedures that are not required at the time.

[0142] Preferably, the second actuator is configured to selectively rotate the wiper member in either direction about the axis extending transverse to the media feed direction. Preferably, the second actuator is configured to selectively vary the speed with which the wiper member is rotated about the axis extending transverse to the media feed direction. Conveniently, the first actuator and the second actuator are both electric motors with encoder disks providing feedback to a print engine controller in the inkjet printer.

[0143] In a further preferred form, the first actuator is configured to apply a force to the chassis at a first bearing point proximate one end of the wiper member, and configured to apply an equal moving force to the chassis at a second bearing point proximate the other end of the wiper member wherein, the first bearing point and the second bearing point are equidistant from a longitudinal mid-point of the wiper member.

[0144] Preferably, the maintenance drive has a first arm engaging the first bearing point and a second arm engaging the second bearing point, the maintenance drive also having a first cam and a second cam, the first cam engaging the first arm and the second cam engaging the second arm, the first and second cam is being mounted for rotation on a common shaft. In a further preferred form, the maintenance drive has a first actuator for rotating the chassis about an axis extending transverse to the media feed direction. In a particularly preferred form, the maintenance drive has a second actuator for rotating the common shaft such that the first actuator and the second actuator can operate independently. Preferably, the wiper member has a plurality of resilient blades extending the width of media substrate. Preferably the plurality of blades are arranged in parallel rows, each of the rows extending the width of media substrate. In a further preferred form, the blades in one of the parallel rows positioned such that they are not in registration with the blades an adjacent one of the parallel rows. In particularly preferred form, blades in each of the parallel rows are spaced from their adjacent blades by a gap allowing independent movement of adjacent blades.

[0145] In some embodiments, the maintenance drive is configured to move the wiper member past the printhead in the media feed direction and opposite the media feed direction. Preferably the chassis is a tubular chassis, the wiper member being mounted to the tubular chassis exterior. In some embodiments, the maintenance facility further comprises a blotter mounted to the tubular chassis exterior. In a further preferred form, the maintenance facility further comprises a capper and print platen mounted to the tube and the chassis exterior. Preferably the tubular chassis has porous material in central cavity and apertures to establish fluid communication between the wiper member and the porous material. In particular preferred form, the wiper member is a moulded elastomeric element.

[0146] Preferably, the printhead maintenance facility further comprises an absorbent pad extending the length of the wiper member such that the maintenance drive moves the wiper member across the absorbent pad after the wiper member has wiped the nozzle face. In some embodiments, the second actuator moves the wiper member across the absorbent pad repeatedly while the first actuator holds the chassis away from the nozzle face so as not contact wiper member. Preferably, the absorbent pad has a cleaning surface which contacts the wiper member, the contact surface being covered with a woven material having stranded less than two deniers. In a further preferred form, the woven material is a blend of polyester and polyamide. In a particularly preferred embodiment the woven material is microfibre. In some embodiments, the absorbent pad has a foam core.

[0147] In a further preferred form the printhead main-

tenance facility further comprises a doctor blade extending transverse to the media feed direction, wherein during use the maintenance drive moves the wiper member over the nozzle face, then across the absorbent pad and then past the doctor blade such that the resilient blade flexes in order to pass the doctor blade and upon disengagement of the resilient blade and the doctor blade, the resilient blade springs back to its quiescent shape thereby projecting contaminants from its surface.

[0148] Accordingly in a twenty fourth aspect the present invention provides a printhead maintenance facility for an inkjet printer having a printhead and a media path for feeding sheets of media substrate in a media feed direction, the printhead having a nozzle face defining an array of nozzles, the printhead maintenance facility comprising:

a wiper member for wiping the nozzle face;
a chassis for supporting the wiper member; and,
a maintenance drive for selectively moving the wiper member across the nozzle face in a first direction or a second direction.

[0149] If paper dust or other contaminants have become lodged on the nozzle face by anchoring to surface irregularities, wiping in a different direction is much more likely to dislodge the contaminants.

[0150] Preferably, the first direction is opposite the second direction. In a further preferred form, the first direction and second direction are parallel to the media feed direction. In particular preferred form the printhead is a pagewidth printhead such that the array of nozzles is elongate and extends the printing width of the sheets of media substrate, the wiper member extending the length of the elongate array of nozzles. In some embodiments, the maintenance drive is configured to rotate the chassis about and axis extending transverse to the media feed direction.

[0151] Preferably, the maintenance drive has a first actuator for moving the wiper member towards away from the nozzle face, and a second actuator for rotating wiper member about an axis extending transverse to the media feed direction, the first actuator and the second actuator being independently operable. Preferably, the second actuator is configured to selectively vary the speed with which the wiper member is rotated about the axis extending transverse to the media feed direction. Conveniently, the first actuator and the second actuator are both electric motors with encoder disks providing feedback to a print engine controller in the inkjet printer.

[0152] In a further preferred form, the first actuator is configured to apply a force to the chassis at a first bearing point proximate one end of the wiper member, and configured to apply an equal moving force to the chassis at a second bearing point proximate the other end of the wiper member wherein, the first bearing point and the second bearing point are equidistant from a longitudinal mid-point of the wiper member.

[0153] Preferably, the maintenance drive has a first arm engaging the first bearing point and a second arm engaging the second bearing point, the maintenance drive also having a first cam and a second cam, the first cam engaging the first arm and the second cam engaging the second arm, the first and second cam is being mounted for rotation on a common shaft. In a further preferred form, the maintenance drive has a first actuator for rotating the chassis about an axis extending transverse to the media feed direction. In a particularly preferred form, the maintenance drive has a second actuator for rotating the common shaft such that the first actuator and the second actuator can operate independently. Preferably, the wiper member has a plurality of resilient blades extending the width of media substrate. Preferably the plurality of blades is arranged in parallel rows, each of the rows extending the width of media substrate. In a further preferred form, the blades in one of the parallel rows positioned such that they are not in registration with the blades an adjacent one of the parallel rows. In particularly preferred form, blades in each of the parallel rows are spaced from their adjacent blades by a gap allowing independent movement of adjacent blades.

[0154] In some embodiments, the chassis is a tubular chassis, the wiper member being mounted to the tubular chassis exterior. In some embodiments, the maintenance facility further comprises a blotter mounted to the tubular chassis exterior. In a further preferred form, the maintenance facility further comprises a capper and print platen mounted to the tubular chassis exterior. Preferably the tubular chassis has porous material in central cavity and apertures to establish fluid communication between the wiper member and the porous material. In particular preferred form, the wiper member is a moulded elastomeric element. In particularly preferred embodiment, the tubular chassis exterior has a plurality of mounting sites, each of the mounting sites being configured to mount any one of the wiper member, the blotter, the capper and the print platen.

[0155] Preferably, the printhead maintenance facility further comprises an absorbent pad extending the length of the wiper member such that the maintenance drive moves the wiper member across the absorbent pad after the wiper member has wiped the nozzle face. In some embodiments, the second actuator moves the wiper member across the absorbent pad repeatedly while the first actuator holds the chassis away from the nozzle face so as not contact wiper member. Preferably, the absorbent pad has a cleaning surface which contacts the wiper member, the contact surface being covered with a woven material having stranded less than two deniers. In a further preferred form, the woven material is a blend of polyester and polyamide. In a particularly preferred embodiment the woven material is microfibre. In some embodiments, the absorbent pad has a foam core.

[0156] In a further preferred form the printhead maintenance facility further comprises a doctor blade extending transverse to the media feed direction, wherein during

use the maintenance drive moves the wiper member over the nozzle face, then across the absorbent pad and then past the doctor blade such that the resilient blade flexes in order to pass the doctor blade and upon disengagement of the resilient blade and the doctor blade, the resilient blade springs back to its quiescent shape thereby projecting contaminants from its surface.

[0157] Accordingly in a twenty fifth aspect the present invention provides a printhead maintenance facility for an inkjet printer with a printhead having a nozzle face defining an array of nozzles, the printhead maintenance facility comprising:

a wiper member for wiping the nozzle face;
a chassis for supporting the wiper member; and,
a maintenance drive for selectively moving the wiper member at variable speeds.

[0158] With a variable speed maintenance drive, the wiper can be brought into contact with the nozzle face at a slower speed to avoid bounce and maintain contact.

[0159] Preferably, the printhead is a pagewidth printhead such that the array of nozzles is elongate and extends the printing width of the sheets of media substrate, the wiper member extending the length of the elongate array of nozzles.

[0160] Preferably, the maintenance drive has a first actuator for moving the wiper member towards away from the nozzle face, and a second actuator for rotating wiper member about an axis extending transverse to the media feed direction, the first actuator and the second actuator being independently operable. Preferably, the second actuator is configured to selectively vary the speed with which the wiper member is rotated about the axis extending transverse to the media feed direction. Conveniently, the first actuator and the second actuator are both electric motors with encoder disks providing feedback to a print engine controller in the inkjet printer. Preferably, the second actuator is reversible such that the wiper member can be rotated in both directions.

[0161] In a further preferred form, the first actuator is configured to apply a force to the chassis at a first bearing point proximate one end of the wiper member, and configured to apply an equal moving force to the chassis at a second bearing point proximate the other end of the wiper member wherein, the first bearing point and the second bearing point are equidistant from a longitudinal mid-point of the wiper member.

[0162] Preferably, the maintenance drive has a first arm engaging the first bearing point and a second arm engaging the second bearing point, the maintenance drive also having a first cam and a second cam, the first cam engaging the first arm and the second cam engaging the second arm, the first and second cam is being mounted for rotation on a common shaft. In a further preferred form, the maintenance drive has a first actuator for rotating the chassis about an axis extending transverse to the media feed direction. In a particularly preferred form, the maintenance drive has a second actuator for rotating the common shaft such that the first actuator and the second actuator can operate independently. Preferably, the wiper member has a plurality of resilient blades extending the width of media substrate. Preferably the plurality of blades is arranged in parallel rows, each of the rows extending the width of media substrate. In a further preferred form, the blades in one of the parallel rows positioned such that they are not in registration with the blades an adjacent one of the parallel rows. In particularly preferred form, blades in each of the parallel rows are spaced from their adjacent blades by a gap allowing independent movement of adjacent blades.

[0163] In some embodiments, the chassis is a tubular chassis, the wiper member being mounted to the tubular chassis exterior. In some embodiments, the maintenance facility further comprises a blotter mounted to the tubular chassis exterior. In a further preferred form, the maintenance facility further comprises a capper and print platen mounted to the tubular chassis exterior. Preferably the tubular chassis has porous material in central cavity and apertures to establish fluid communication between the wiper member and the porous material. In particular preferred form, the wiper member is a moulded elastomeric element. In particularly preferred embodiment, the tubular chassis exterior has a plurality of mounting sites, each of the mounting sites being configured to mount any one of the wiper member, the blotter, the capper and the print platen.

[0164] Preferably, the printhead maintenance facility further comprises an absorbent pad extending the length of the wiper member such that the maintenance drive moves the wiper member across the absorbent pad after the wiper member has wiped the nozzle face. In some embodiments, the second actuator moves the wiper member across the absorbent pad repeatedly while the first actuator holds the chassis away from the nozzle face so as not contact wiper member. Preferably, the absorbent pad has a cleaning surface which contacts the wiper member, the contact surface being covered with a woven material having stranded less than two deniers. In a further preferred form, the woven material is a blend of polyester and polyamide. In a particularly preferred embodiment the woven material is microfibre. In some embodiments, the absorbent pad has a foam core.

[0165] In a further preferred form the printhead maintenance facility further comprises a doctor blade extending transverse to the media feed direction, wherein during use the maintenance drive moves the wiper member over the nozzle face, then across the absorbent pad and then past the doctor blade such that the resilient blade flexes in order to pass the doctor blade and upon disengagement of the resilient blade and the doctor blade, the resilient blade springs back to its quiescent shape thereby projecting contaminants from its surface.

[0166] Accordingly in a twenty sixth aspect the present invention provides a method of wiping a printhead with a nozzle face defining an array of nozzles for ejecting ink

on to a media substrate fed past the printhead in a media feed direction, the method comprising the steps of:

providing a wiper member in the printer;
moving the wiper member into the media feed path;
wiping all the nozzles in the nozzle face with a single traverse of the wiper member in a direction parallel to the media feed direction.

[0167] The ordinary worker will appreciate that the array of nozzles on a printhead is much longer in the direction transverse to the media feed direction than the direction parallel to media feed direction. This is particularly true of pagewidth printheads. Moving the wiper parallel to the media feed direction, so that it wipes all the nozzles in a single traverse, reduces the time taken for each wiping operation. This speeds of the overall maintenance regime and allows the nozzles to be wiped before every print job to maintain print quality.

[0168] Preferably, the wiper member is rotated about an axis extending transverse to the media feed direction when it is moved into the media feed path and traversed across the nozzle face. Preferably, the printhead is a pagewidth printhead and the array of nozzles is elongate and extends the printing width of the media substrate such that the wiper member also extends the length of the nozzle array. Preferably, the method further comprises the steps of moving a spittoon into the media feed path after all the nozzles in the nozzle face have been wiped, and ejecting ink from all the nozzles into the spittoon. Preferably, the method further comprises the steps of providing the spittoon within a print platen, the print platen having a profiled guide surface for directing sheets of the media substrate past the printhead and a central recessed portion, the spittoon having an absorbent elements positioned in the central recessed portion of the print platen. Preferably, the print platen is moved into the media feed path and presented to the printhead by rotating it about the axis extending transverse to the media feed direction under which the wiper member rotates. Preferably, the wiper member and the print platen are fixed to a chassis mounted on the printer for rotation about the axis is transverse to the media feed direction. In a further preferred form, a capper for capping the array of nozzles when the printer is not in use, is also fixed to the chassis. Optionally, a primer for servicing the nozzle array when the printhead primes with ink, is also fixed to the chassis.

[0169] Optionally, an additional spittoon is fixed to the chassis for use during an extended ink purge from the printhead. Optionally, the wiper member is rotated about the axis transverse to media feed direction at variable speeds. Optionally, the wiper member is selectively rotated in either direction about the axis transverse to the media feed direction. In a particularly preferred form, the chassis is mounted towards an away from the nozzle face. Preferably, the chassis is moved by the application of equal forces to bearing points in the chassis that are equidistantly positioned from the longitudinal mid-point of the wiper member. In particularly preferred form, the pagewidth printhead has a plurality of printhead ICs aligned end to end to extend transverse to the media feed direction, the printhead ICs receiving power and data from a line of wire bonds along one of the transverse sides of the printhead ICs, and the wiper member being rotated such that it moves towards the line of wire bonds. Preferably, the line of wire bonds are sealed within a bead of encapsulant, the bead of encapsulant being profiled to assist the wiper member to retain paper dust and other contaminants wiped from the nozzle face.

[0170] Preferably, the wiper member has a plurality of resilient blades extending the width of media substrate. Preferably the plurality of blades is arranged in parallel rows, each of the rows extending the width of media substrate. In a further preferred form, the blades in one of the parallel rows positioned such that they are not in registration with the blades an adjacent one of the parallel rows. In particularly preferred form, blades in each of the parallel rows are spaced from their adjacent blades by a gap allowing independent movement of adjacent blades.

[0171] Preferably, the step of moving the chassis is performed by a maintenance drive provided a printer, the maintenance drive having a first actuator for moving the wiper member towards away from the nozzle face, and a second actuator for rotating wiper member about the axis extending transverse to the media feed direction, the first actuator and the second actuator being independently operable. Preferably, the second actuator is configured to selectively vary the speed with which the wiper member is rotated about the axis extending transverse to the media feed direction. Conveniently, the first actuator and the second actuator are both electric motors with encoder disks providing feedback to a print engine controller in the inkjet printer. Preferably, the second actuator is reversible such that the wiper member can be rotated in both directions.

[0172] Preferably, the method further comprises step of providing an absorbent pad printer removing paper dust and other contaminants on the wiper member. Preferably, method further comprises the step of providing a doctor blade in the printer such that its extends transverse to the media feed direction, wherein during use the maintenance drive moves the wiper member over the nozzle face, then across the absorbent pad and then past the doctor blade such that the resilient blade flexes in order to pass the doctor blade and upon disengagement of the resilient blade and the doctor blade, the resilient blade springs back to its quiescent shape thereby projecting contaminants from its surface.

[0173] Accordingly in a twenty seventh aspect the present invention provides a method of priming a printhead cartridge upon installation in a printer, the printhead cartridge having a printhead with a nozzle face defining an array of nozzles for ejecting ink on to a media substrate fed past the printhead in a media feed direction, the method comprising the steps of:

providing a printer with at least three ink tanks for storing the inks of different colour, the printer also having a cradle for supporting the printhead cartridge adjacent a media feed path, a fluid interface in fluid communication with the ink tanks, and a latch for securing the printhead cartridge in the cradle, the latch being movable between an open position where access to the cradle is unobstructed, and a closed position where access to the cradle is obstructed;

placing the printhead cartridge in the cradle while the latch is in the open position, the printhead cartridge having a fluid coupling positioned to align with the fluid interface when placed in the cradle;

moving the latch to the closed position to secure the printhead cartridge in cradle;

providing a mechanical linkage between the latch and the fluid interface such that the fluid interface sealingly engages the fluid coupling upon moving the latch to the closed position; and,

priming the printhead with ink from all of the ink tanks.

[0174] By providing a mechanical linkage from the latch to the fluid interface between the printer of the cartridge, securing the printhead cartridge also performs the fluid connection between the printhead and all the ink tanks. This makes the installation process conveniently quick and simple for the user.

[0175] Preferably, the steps of priming the printhead further comprises pumping ink from all the ink tanks to the fluid interface under pressure. Preferably, the printhead is a pagewidth printhead and the array of nozzles extends the printing width of the media substrate. Preferably, the fluid coupling is an array of spouts extending from an interface plate, and the fluid interface is a corresponding when the sockets such that step of sealingly engaging the fluid interface in fluid coupling involves moving the sockets onto the array of spouts. In a further preferred form, the cradle provides a reference surface of contacting the datum the printhead cartridge such that the nozzle face is precisely spaced from the media feed path. In a particularly preferred form, the printhead cartridge has a first fluid coupling and a second fluid coupling, and the printer has a first fluid interface and a second fluid interface, the first fluid interface being in fluid communication with the ink tanks and second fluid interface being in fluid communication with a waste ink outlet, the first fluid coupling for sealingly engaging the first fluid interface, and the second fluid coupling for sealingly engaging the second fluid interface. Preferably the printer has support structure with a first and second bearing surface positioned in the cradle for contacting the printhead cartridge, the first bearing surface being aligned with any compressive force applied to the printhead cartridge by the first fluid interface as it engages the first fluid coupling, and the second bearing surface being aligned with any compressive force applied to the printhead cartridge by the second fluid interface as it engages the second fluid coupling. In a particularly preferred form, the support structure has a third bearing surface of aligned with any compressive force applied to the printhead cartridge by the latch as it secures the cartridge in the cradle.

[0176] In a particularly preferred form, the step of priming the printhead cartridge further comprises providing a wiper member in the printer, moving the wiper member into the media feed path, and wiping all the nozzles in the nozzle face with a single traverse of the wiper member in a direction parallel to the media feed direction.

[0177] Preferably, the wiper member is rotated about an axis extending transverse to the media feed direction when it is moved into the media feed path and traversed across the nozzle face. Preferably, the printhead is a pagewidth printhead and the array of nozzles is elongate and extends the printing width of the media substrate such that the wiper member also extends the length of the nozzle array. Preferably, the method further comprises the steps of moving a spittoon into the media feed path after all the nozzles in the nozzle face have been wiped, and ejecting ink from all the nozzles into the spittoon. Preferably, the method further comprises the steps of providing the spittoon within a print platen, the print platen having a profiled guide surface for directing sheets of the media substrate past the printhead and a central recessed portion, the spittoon having an absorbent elements positioned in the central recessed portion of the print platen. Preferably, the print platen is moved into the media feed path and presented to the printhead by rotating it about the axis extending transverse to the media feed direction under which the wiper member rotates. Preferably, the wiper member and the print platen are fixed to a chassis mounted on the printer for rotation about the axis is transverse to the media feed direction. In a further preferred form, a capper for capping the array of nozzles when the printer is not in use, is also fixed to the chassis. Optionally, a primer for servicing the nozzle array when the printhead primes with ink, is also fixed to the chassis.

[0178] Optionally, an additional spittoon is fixed to the chassis for use during an extended ink purge from the printhead. Optionally, the wiper member is rotated about the axis transverse to media feed direction at variable speeds. Optionally, the wiper member is selectively rotated in either direction about the axis transverse to the media feed direction. In a particularly preferred form, the chassis is mounted towards an away from the nozzle face. Preferably, the chassis is moved by the application of equal forces to bearing points in the chassis that are equidistantly positioned from the longitudinal mid-point of the wiper member. In particularly preferred form, the pagewidth printhead has a plurality of printhead ICs aligned end to end to extend transverse to the media feed direction, the printhead ICs receiving power and data from a line of wire bonds along one of the transverse sides of the printhead ICs, and the wiper member being rotated such that it moves towards the line of wire bonds. Preferably, the line of wire bonds are sealed within a bead

of encapsulant, the bead of encapsulant being profiled to assist the wiper member to retain paper dust and other contaminants wiped from the nozzle face.

[0179] Preferably, the wiper member has a plurality of resilient blades extending the width of media substrate. Preferably the plurality of blades is arranged in parallel rows, each of the rows extending the width of media substrate. In a further preferred form, the blades in one of the parallel rows positioned such that they are not in registration with the blades an adjacent one of the parallel rows. In particularly preferred form, blades in each of the parallel rows are spaced from their adjacent blades by a gap allowing independent movement of adjacent blades.

[0180] Preferably, the step of moving the chassis is performed by a maintenance drive provided a printer, the maintenance drive having a first actuator for moving the wiper member towards away from the nozzle face, and a second actuator for rotating wiper member about the axis extending transverse to the media feed direction, the first actuator and the second actuator being independently operable. Preferably, the second actuator is configured to selectively vary the speed with which the wiper member is rotated about the axis extending transverse to the media feed direction. Conveniently, the first actuator and the second actuator are both electric motors with encoder disks providing feedback to a print engine controller in the inkjet printer. Preferably, the second actuator is reversible such that the wiper member can be rotated in both directions.

[0181] Preferably, the method further comprises step of providing an absorbent pad printer removing paper dust and other contaminants on the wiper member. Preferably, method further comprises the step of providing a doctor blade in the printer such that its extends transverse to the media feed direction, wherein during use the maintenance drive moves the wiper member over the nozzle face, then across the absorbent pad and then past the doctor blade such that the resilient blade flexes in order to pass the doctor blade and upon disengagement of the resilient blade and the doctor blade, the resilient blade springs back to its quiescent shape thereby projecting contaminants from its surface.

[0182] Accordingly in a twenty eighth aspect the present invention provides a method of priming a printhead in an inkjet printer, the printhead having a nozzle face defining an array of nozzles for ejecting ink on to a media substrate fed past the printhead in a media feed direction, the method comprising the steps of:

providing a pad having a contact face dimensioned so that it can encompass all the nozzles in the array;
moving the pad such that the contact face engages the nozzle face to cover the array of nozzles;
forcing ink into the printhead under pressure until ink flows out the nozzles in the array; and,
withdrawing the pad such that the contact face disengages the nozzle face.

[0183] Holding a pad against the nozzle array as it is being primed under pressure, significantly reduces the volume of ink purged through the nozzles. The pad partially obstructs the nozzles to constrict the flow of ink. However the flow of air out of the nozzles is much less constricted, so the overall priming process is not delayed because of the flow obstruction generated by the pad material.

[0184] Preferably, the method further comprises step of wiping the nozzle face with a wiper member after the step of withdrawing the pad to disengage the contact face. In a particularly preferred form, the method further comprises step of ejecting ink from all the nozzles into a spittoon after the nozzle face has been wiped. In a further preferred form, the pad is positioned within a skirt of resilient material for sealing against the printhead to contain any ink leakage. In some embodiments, the method further comprises step of providing the printhead has a printhead cartridge for user removal and replacement from the printer.

[0185] In specific embodiments, the printer has at least three ink tanks for storing the inks of different colour, the printer also having a cradle for supporting the printhead cartridge adjacent a media feed path, a fluid interface in fluid communication with the ink tanks, and a latch for securing the printhead cartridge in the cradle, the latch being movable between an open position where access to the cradle is unobstructed, and a closed position where access to the cradle is obstructed, such that the method further comprises the steps of placing the printhead cartridge in the cradle while the latch is in the open position, the printhead cartridge having a fluid coupling positioned to align with the fluid interface when placed in the cradle, moving the latch to the closed position to secure the printhead cartridge in cradle, providing a mechanical linkage between the latch and the fluid interface such that the fluid interface sealingly engages the fluid coupling upon moving the latch to the closed position, before the step of forcing ink into the printhead cartridge under pressure.

[0186] Preferably, the steps of forcing ink into the printhead the printhead further comprises pumping ink from all the ink tanks to the fluid interface under pressure. Preferably, the printhead is a pagewidth printhead and the array of nozzles extends the printing width of the media substrate. Preferably, the fluid coupling is an array of spouts extending from an interface plate, and the fluid interface is a corresponding when the sockets such that step of sealingly engaging the fluid interface in fluid coupling involves moving the sockets onto the array of spouts. In a further preferred form, the cradle provides a reference surface of contacting the datum the printhead cartridge such that the nozzle face is precisely spaced from the media feed path. In a particularly preferred form, the printhead cartridge has a first fluid coupling and a second fluid coupling, and the printer has a first fluid interface and a second fluid interface, the first fluid interface being in fluid communication with the ink tanks and second fluid interface being in fluid communication with a

waste ink outlet, the first fluid coupling for sealingly engaging the first fluid interface, and the second fluid coupling for sealingly engaging the second fluid interface. Preferably the printer has support structure with a first and second bearing surface positioned in the cradle for contacting the printhead cartridge, the first bearing surface being aligned with any compressive force applied to the printhead cartridge by the first fluid interface as it engages the first fluid coupling, and the second bearing surface being aligned with any compressive force applied to the printhead cartridge by the second fluid interface as it engages the second fluid coupling. In a particularly preferred form, the support structure has a third bearing surface of aligned with any compressive force applied to the printhead cartridge by the latch as it secures the cartridge in the cradle.

[0187] In a particularly preferred form, the step of priming the printhead cartridge further comprises providing a wiper member in the printer, moving the wiper member into the media feed path, and wiping all the nozzles in the nozzle face with a single traverse of the wiper member in a direction parallel to the media feed direction.

[0188] Preferably, the wiper member is rotated about an axis extending transverse to the media feed direction when it is moved into the media feed path and traversed across the nozzle face. Preferably, the printhead is a pagewidth printhead and the array of nozzles is elongate and extends the printing width of the media substrate such that the wiper member also extends the length of the nozzle array. Preferably, the method further comprises the steps of providing the spittoon within a print platen, the print platen having a profiled guide surface for directing sheets of the media substrate past the printhead and a central recessed portion, the spittoon having an absorbent elements positioned in the central recessed portion of the print platen. Preferably, the print platen is moved into the media feed path and presented to the printhead by rotating it about the axis extending transverse to the media feed direction under which the wiper member rotates. Preferably, the wiper member and the print platen are fixed to a chassis mounted on the printer for rotation about the axis is transverse to the media feed direction. In a further preferred form, a capper for capping the array of nozzles when the printer is not in use, is also fixed to the chassis. Optionally, a primer for servicing the nozzle array when the printhead primes with ink, is also fixed to the chassis.

[0189] Optionally, an additional spittoon is fixed to the chassis for use during an extended ink purge from the printhead. Optionally, the wiper member is rotated about the axis transverse to media feed direction at variable speeds. Optionally, the wiper member is selectively rotated in either direction about the axis transverse to the media feed direction. In a particularly preferred form, the chassis is mounted towards an away from the nozzle face. Preferably, the chassis is moved by the application of equal forces to bearing points in the chassis that are equidistantly positioned from the longitudinal mid-point of the wiper member. In particularly preferred form, the pagewidth printhead has a plurality of printhead ICs aligned end to end to extend transverse to the media feed direction, the printhead ICs receiving power and data from a line of wire bonds along one of the transverse sides of the printhead ICs, and the wiper member being rotated such that it moves towards the line of wire bonds. Preferably, the line of wire bonds are sealed within a bead of encapsulant, the bead of encapsulant being profiled to assist the wiper member to retain paper dust and other contaminants wiped from the nozzle face.

[0190] Preferably, the wiper member has a plurality of resilient blades extending the width of media substrate. Preferably the plurality of blades is arranged in parallel rows, each of the rows extending the width of media substrate. In a further preferred form, the blades in one of the parallel rows positioned such that they are not in registration with the blades an adjacent one of the parallel rows. In particularly preferred form, blades in each of the parallel rows are spaced from their adjacent blades by a gap allowing independent movement of adjacent blades.

[0191] Preferably, the step of moving the chassis is performed by a maintenance drive provided a printer, the maintenance drive having a first actuator for moving the wiper member towards away from the nozzle face, and a second actuator for rotating wiper member about the axis extending transverse to the media feed direction, the first actuator and the second actuator being independently operable. Preferably, the second actuator is configured to selectively vary the speed with which the wiper member is rotated about the axis extending transverse to the media feed direction. Conveniently, the first actuator and the second actuator are both electric motors with encoder disks providing feedback to a print engine controller in the inkjet printer. Preferably, the second actuator is reversible such that the wiper member can be rotated in both directions.

[0192] Preferably, the method further comprises step of providing an absorbent pad printer removing paper dust and other contaminants on the wiper member. Preferably, method further comprises the step of providing a doctor blade in the printer such that its extends transverse to the media feed direction, wherein during use the maintenance drive moves the wiper member over the nozzle face, then across the absorbent pad and then past the doctor blade such that the resilient blade flexes in order to pass the doctor blade and upon disengagement of the resilient blade and the doctor blade, the resilient blade springs back to its quiescent shape thereby projecting contaminants from its surface.

[0193] Accordingly in a twenty ninth aspect the present invention provides a method of inserting a printhead cartridge in a printer, the printhead cartridge having a printhead with a nozzle face defining an array of nozzles for ejecting ink on to a media substrate fed past the printhead in a media feed direction, the method comprising the steps of:

providing a printer with at least three ink tanks for storing the inks of different colour, the printer also having a cradle defining a reference surface for engaging a datum point on the printhead cartridge to support the nozzle face at a precise spacing from a media feed path, a fluid interface in fluid communication with the ink tanks, and a latch for securing the printhead cartridge in the cradle, the latch being movable between an open position where access to the cradle is unobstructed, and a closed position where access to the cradle is obstructed;

placing the printhead cartridge in the cradle such that the data point rests on the reference surface while the latch is in the open position, the printhead cartridge having a fluid coupling positioned to align with the fluid interface when placed in the cradle;

moving the latch to the closed position to secure the printhead cartridge in cradle;

providing a mechanical linkage between the latch and the fluid interface such that the fluid interface sealingly engages the fluid coupling upon moving the latch to the closed position; wherein,

any force exerted on the printhead cartridge during sealing engagement of the fluid interface and the fluid coupling is not directed to disengage the reference surface from the datum point.

[0194] The ordinary worker will appreciate that the need to fluidically couple the printhead cartridge to the printer during the cartridge insertion, immediately suggests that the fluid interface should be aligned with the direction cartridge insertion. However the cartridge is then prone to rest on the resilient parts of the fluid coupling so that the precise spacing between the nozzle face on the media feed path is compromised. By placing the printhead cartridge into the cradle so that the reference surface and data point are in contact before the fluid coupling is made, and positioning the fluid coupling so that its engagement with the fluid interface does not disengage the data point and the reference surface, the precise spacing between the nozzle face and the media feed path is maintained.

[0195] Preferably, the step of sealingly engaging the fluid interface in fluid coupling involves the fluid interface advancing onto the fluid coupling in the direction that is not disengage the data reference surface and the datum point. In a further preferred form, the fluid interface moves parallel to the media feed direction when sealingly engaging fluid coupling.

[0196] Preferably, the method further comprises the step of priming the printhead with ink from all of the ink tanks. Preferably, the step of priming the printhead further comprises pumping ink from all the ink tanks to the fluid interface under pressure. Preferably, the printhead is a pagewidth printhead and the array of nozzles extends the printing width of the media substrate. Preferably, the fluid coupling is an array of spouts extending from an interface plate, and the fluid interface is a corresponding when the sockets such that step of sealingly engaging the fluid interface in fluid coupling involves moving the sockets onto the array of spouts. In a further preferred form, the cradle provides a reference surface of contacting the datum the printhead cartridge such that the nozzle face is precisely spaced from the media feed path. In a particularly preferred form, the printhead cartridge has a first fluid coupling and a second fluid coupling, and the printer has a first fluid interface and a second fluid interface, the first fluid interface being in fluid communication with the ink tanks and second fluid interface being in fluid communication with a waste ink outlet, the first fluid coupling for sealingly engaging the first fluid interface, and the second fluid coupling for sealingly engaging the second fluid interface. Preferably the printer has support structure with a first and second bearing surface positioned in the cradle for contacting the printhead cartridge, the first bearing surface being aligned with any compressive force applied to the printhead cartridge by the first fluid interface as it engages the first fluid coupling, and the second bearing surface being aligned with any compressive force applied to the printhead cartridge by the second fluid interface as it engages the second fluid coupling. In a particularly preferred form, the support structure has a third bearing surface of aligned with any compressive force applied to the printhead cartridge by the latch as it secures the cartridge in the cradle.

[0197] In a particularly preferred form, the step of priming the printhead cartridge further comprises providing a wiper member in the printer, moving the wiper member into the media feed path, and wiping all the nozzles in the nozzle face with a single traverse of the wiper member in a direction parallel to the media feed direction.

[0198] Preferably, the wiper member is rotated about an axis extending transverse to the media feed direction when it is moved into the media feed path and traversed across the nozzle face. Preferably, the printhead is a pagewidth printhead and the array of nozzles is elongate and extends the printing width of the media substrate such that the wiper member also extends the length of the nozzle array. Preferably, the method further comprises the steps of moving a spittoon into the media feed path after all the nozzles in the nozzle face have been wiped, and ejecting ink from all the nozzles into the spittoon. Preferably, the method further comprises the steps of providing the spittoon within a print platen, the print platen having a profiled guide surface for directing sheets of the media substrate past the printhead and a central recessed portion, the spittoon having an absorbent elements positioned in the central recessed portion of the print platen. Preferably, the print platen is moved into the media feed path and presented to the printhead by rotating it about the axis extending transverse to the media feed direction under which the wiper member rotates. Preferably, the wiper member and the print platen are fixed to a chassis mounted on the printer for rotation about the axis is transverse to the media feed direction. In a further preferred form, a capper for capping the array

of nozzles when the printer is not in use, is also fixed to the chassis. Optionally, a primer for servicing the nozzle array when the printhead primes with ink, is also fixed to the chassis.

[0199] Optionally, an additional spittoon is fixed to the chassis for use during an extended ink purge from the printhead. Optionally, the wiper member is rotated about the axis transverse to media feed direction at variable speeds. Optionally, the wiper member is selectively rotated in either direction about the axis transverse to the media feed direction. In a particularly preferred form, the chassis is mounted towards an away from the nozzle face. Preferably, the chassis is moved by the application of equal forces to bearing points in the chassis that are equidistantly positioned from the longitudinal mid-point of the wiper member. In particularly preferred form, the pagewidth printhead has a plurality of printhead ICs aligned end to end to extend transverse to the media feed direction, the printhead ICs receiving power and data from a line of wire bonds along one of the transverse sides of the printhead ICs, and the wiper member being rotated such that it moves towards the line of wire bonds. Preferably, the line of wire bonds are sealed within a bead of encapsulant, the bead of encapsulant being profiled to assist the wiper member to retain paper dust and other contaminants wiped from the nozzle face.

[0200] Preferably, the wiper member has a plurality of resilient blades extending the width of media substrate. Preferably the plurality of blades is arranged in parallel rows, each of the rows extending the width of media substrate. In a further preferred form, the blades in one of the parallel rows positioned such that they are not in registration with the blades an adjacent one of the parallel rows. In particularly preferred form, blades in each of the parallel rows are spaced from their adjacent blades by a gap allowing independent movement of adjacent blades.

[0201] Preferably, the step of moving the chassis is performed by a maintenance drive provided a printer, the maintenance drive having a first actuator for moving the wiper member towards away from the nozzle face, and a second actuator for rotating wiper member about the axis extending transverse to the media feed direction, the first actuator and the second actuator being independently operable. Preferably, the second actuator is configured to selectively vary the speed with which the wiper member is rotated about the axis extending transverse to the media feed direction. Conveniently, the first actuator and the second actuator are both electric motors with encoder disks providing feedback to a print engine controller in the inkjet printer. Preferably, the second actuator is reversible such that the wiper member can be rotated in both directions.

[0202] Preferably, the method further comprises step of providing an absorbent pad printer removing paper dust and other contaminants on the wiper member. Preferably, method further comprises the step of providing a doctor blade in the printer such that its extends transverse to the media feed direction, wherein during use the maintenance drive moves the wiper member over the nozzle face, then across the absorbent pad and then past the doctor blade such that the resilient blade flexes in order to pass the doctor blade and upon disengagement of the resilient blade and the doctor blade, the resilient blade springs back to its quiescent shape thereby projecting contaminants from its surface.

[0203] Accordingly in a thirtieth aspect the present invention provides an inkjet printer comprising:

at least three ink tanks for storing inks of different colour;
the printhead cartridge having a printhead with a nozzle face defining an array of nozzles, and a fluid coupling for supplying the printhead with ink from each of the ink tanks;
a cradle defining a reference surface for engaging a datum point on the printhead cartridge to support the nozzle face at a precise spacing from a media feed path;
a latch for securing the printhead cartridge in the cradle, the latch being movable between an open position where access to the cradle is unobstructed, and a closed position where access to the cradle is obstructed, the latch configured to apply a compressive force urging the datum point on the printhead cartridge into engagement with the reference surface;
a fluid interface in fluid communication with the ink tanks; and,
a mechanical linkage between the latch and the fluid interface such that the fluid interface is displaced into sealed engagement with the fluid coupling upon moving the latch to the closed position, the fluid interface being displaced in a direction that does affect the compressive force between the datum point and the reference surface.

[0204] The fluid connection is formed by moving the printer coupling transverse to the pressure applied by the latch on the cartridge through to the cradle. In this way, the nozzle face stays at the correct spacing from the media feed path. The stresses applied by the fluid coupling may flex or distort cartridge, but not in a way that changes the correct spacing from the feed path. The ordinary worker will appreciate that a pagewidth printhead is particular prone to distortion because of its extended length.

[0205] Preferably, the fluid interface is displaced in a direction parallel to the media feed direction. In a further preferred form, the compressive force applied by the latch acts normal to the media feed direction. Preferably, the fluid interface engages the fluid coupling to prime the printhead with ink from all of the ink tanks. Preferably, the printhead is a pagewidth printhead and the array of nozzles extends the printing width of the media substrate. Preferably, the fluid coupling is an array of spouts extending from an interface plate, and the fluid interface is a corresponding when the sockets such that step of seal-

ingly engaging the fluid interface in fluid coupling involves moving the sockets onto the array of spouts.

[0206] In a particularly preferred form, the printhead cartridge has a first fluid coupling and a second fluid coupling, and the printer has a first fluid interface and a second fluid interface, the first fluid interface being in fluid communication with the ink tanks and second fluid interface being in fluid communication with a waste ink outlet, the first fluid coupling for sealingly engaging the first fluid interface, and the second fluid coupling for sealingly engaging the second fluid interface. Preferably the printer has support structure with a first and second bearing surface positioned in the cradle for contacting the printhead cartridge, the first bearing surface being aligned with any compressive force applied to the printhead cartridge by the first fluid interface as it engages the first fluid coupling, and the second bearing surface being aligned with any compressive force applied to the printhead cartridge by the second fluid interface as it engages the second fluid coupling. In a particularly preferred form, the support structure has a third bearing surface of aligned with any compressive force applied to the printhead cartridge by the latch as it secures the cartridge in the cradle.

[0207] In a particularly preferred form, the printer has a wiper member for moving into the media feed path and wiping all the nozzles in the nozzle face with a single traverse of the wiper member in a direction parallel to the media feed direction.

[0208] Preferably, the wiper member is rotated about an axis extending transverse to the media feed direction when it is moved into the media feed path and traversed across the nozzle face. Preferably, the printer has a spittoon for moving into the media feed path after all the nozzles in the nozzle face have been wiped, and ejecting ink from all the nozzles into the spittoon. Preferably, the spittoon is positioned within a print platen, the print platen having a profiled guide surface for directing sheets of the media substrate past the printhead and a central recessed portion, the spittoon having an absorbent elements positioned in the central recessed portion of the print platen. Preferably, the print platen is moved into the media feed path and presented to the printhead by rotating it about the axis extending transverse to the media feed direction under which the wiper member rotates. Preferably, the wiper member and the print platen are fixed to a chassis mounted on the printer for rotation about the axis is transverse to the media feed direction. In a further preferred form, a capper for capping the array of nozzles when the printer is not in use, is also fixed to the chassis. Optionally, a primer for servicing the nozzle array when the printhead primes with ink, is also fixed to the chassis.

[0209] Optionally, an additional, larger spittoon is fixed to the chassis for use during an extended ink purge from the printhead. Optionally, the wiper member is rotated about the axis transverse to media feed direction at variable speeds. Optionally, the wiper member is selectively rotated in either direction about the axis transverse to the media feed direction. In a particularly preferred form, the chassis is mounted towards an away from the nozzle face. Preferably, the chassis is moved by the application of equal forces to bearing points in the chassis that are equidistantly positioned from the longitudinal mid-point of the wiper member. In particularly preferred form, the pagewidth printhead has a plurality of printhead ICs aligned end to end to extend transverse to the media feed direction, the printhead ICs receiving power and data from a line of wire bonds along one of the transverse sides of the printhead ICs, and the wiper member being rotated such that it moves towards the line of wire bonds. Preferably, the line of wire bonds are sealed within a bead of encapsulant, the bead of encapsulant being profiled to assist the wiper member to retain paper dust and other contaminants wiped from the nozzle face.

[0210] Preferably, the wiper member has a plurality of resilient blades extending the width of media substrate. Preferably the plurality of blades is arranged in parallel rows, each of the rows extending the width of media substrate. In a further preferred form, the blades in one of the parallel rows positioned such that they are not in registration with the blades an adjacent one of the parallel rows. In particularly preferred form, blades in each of the parallel rows are spaced from their adjacent blades by a gap allowing independent movement of adjacent blades.

[0211] Preferably, the step of moving the chassis is performed by a maintenance drive provided a printer, the maintenance drive having a first actuator for moving the wiper member towards away from the nozzle face, and a second actuator for rotating wiper member about the axis extending transverse to the media feed direction, the first actuator and the second actuator being independently operable. Preferably, the second actuator is configured to selectively vary the speed with which the wiper member is rotated about the axis extending transverse to the media feed direction. Conveniently, the first actuator and the second actuator are both electric motors with encoder disks providing feedback to a print engine controller in the inkjet printer. Preferably, the second actuator is reversible such that the wiper member can be rotated in both directions.

[0212] Preferably, the method further comprises step of providing an absorbent pad printer removing paper dust and other contaminants on the wiper member. Preferably, method further comprises the step of providing a doctor blade in the printer such that its extends transverse to the media feed direction, wherein during use the maintenance drive moves the wiper member over the nozzle face, then across the absorbent pad and then past the doctor blade such that the resilient blade flexes in order to pass the doctor blade and upon disengagement of the resilient blade and the doctor blade, the resilient blade springs back to its quiescent shape thereby projecting contaminants from its surface.

BRIEF DESCRIPTION OF THE DRAWINGS

[0213] Preferred embodiments of the invention will now be described by way of example only, with reference to the accompanying figures, in which:

Figure 1 is schematic overview of the printer fluidic system;
Figure 2A is a perspective of the printhead cartridge of the present invention installed the print engine of a printer;
Figure 2B shows the print engine without the printhead cartridge installed to expose the inlet and outlet ink couplings;
Figure 3 is a perspective of the complete printhead cartridge according to the present invention;
Figure 4 shows the printhead cartridge of Fig. 3 with the protective cover removed;
Figure 5 is an exploded is a partial perspective of the printhead assembly within the printhead cartridge of Fig. 3;
Figure 6 is an exploded perspective of the printhead assembly without the inlet or outlet manifolds or the top cover molding;
Figure 7 is a sectional perspective view of the print engine, the section taken through the line 7-7 of Figure 2A;
Figure 8 is a sectional elevation of the print engine taken through line 7-7 of Figure 2A, showing the maintenance carousel drawing the wiper blades over the doctor blade;
Figure 9 is a section view showing the maintenance carousel after drawing the wiper blades over the absorbent cleaning pad;
Figure 10 is a sectional view showing the maintenance carousel being lifted to cap the printhead with the capper maintenance station;
Figure 11 is a sectional view showing the maintenance carousel being lowered in order to uncap the printhead;
Figure 12 is a sectional view showing the wiper blades wiping the nozzle face of the printhead;
Figure 13 is a sectional view showing the maintenance carousel rotated back to its initial position shown in Figure 8 where the wiper blades have been drawn past the doctor blade to flick contaminants of the tip region;
Figure 14 is a sectional view showing the wiper blades been drawn across the absorbent cleaning pad;
Figure 15 is a sectional view showing the maintenance carousel rotated to present the printhead capper to the printhead;
Figure 16 is a sectional view showing the maintenance carousel being lifted to present the print platen to the printhead;
Figure 17 is a sectional view showing the way that is carousel being lifted to seal the printhead ICs with the capper;
Figure 18 is a perspective view of the maintenance carousel in isolation;
Figure 19 is another perspective view of the maintenance carousel in isolation in showing the carousel drive spur gear;
Figure 20 is an exploded perspective of the maintenance carousel in isolation;
Figure 21 is a cross-sectional through an intermediate point along the carousel length;
Figure 22 is a schematic section view of a second embodiment of the maintenance carousel, the maintenance carousel presenting a print platen to the printhead;
Figure 23 is a schematic section view of the second embodiment of the maintenance carousel with the printhead priming station engaging the printhead:
Figure 24 is a schematic section view of the second embodiment of the maintenance carousel with the wiper blades engaging the printhead;
Figure 25 is a schematic section view of the second embodiment of the maintenance carousel with an ink spittoon presented to the printhead;
Figure 26 is a schematic section view of the second time of maintenance carousel with the print platen presented to the printhead as the wiper blades are cleaned on the absorbent pad;
Figure 27 is a section view of the injection moulded core used in the second embodiment of the maintenance carousel;
Figure 28 is a schematic view of the injection moulding forms being removed from the core of the second embodiment of maintenance carousel;
Figure 29 is a section view of the print platen maintenance station shown in isolation;
Figure 30 is a section view of the printhead capper maintenance station shown in isolation;
Figure 31 is a section view of the wiper blade maintenance station shown in isolation;
Figure 32 is a section view of the printhead priming station shown in isolation;
Figure 33 is a section view of a blotting station shown in isolation;
Figure 34 is a schematic section view of a third embodiment of the maintenance carousel;
Figure 35 is a sketch of a first embodiment of the wiper member;
Figure 36 is a sketch of a second embodiment of the wiper member;
Figure 37 is a sketch of a third embodiment of the wiper member;
Figure 38 is a sketch of the fourth moment of the wiper member;
Figure 39 is a sketch of the fifth embodiment of the wiper member;
Figure 40 is a sketch of the sixth embodiment of the wiper member;
Figure 41 is a sketch of the seventh embodiment of

the wiper member;
Figure 42 is a sketch of the eighth embodiment of the wiper member;
Figures 43A and 43B sketches of a nine embodiment of the wiper member;
Figure 44 is a sketch of a 10th embodiment of the wiper member;
Figure 45 is sketch of an 11th embodiment of the wiper member;
Figure 46 is sketch of a 12 embodiment of the wiper member;
Figure 47 is the sectional perspective of the print engine without the printhead cartridge for the maintenance carousel;
Figure 48 is a perspective showing the independent drive assemblies used by the print engine;
Figure 49 is an exploded perspective of the independent drive assemblies shown in Figure 48; and,
Figure 50 is an enlarged view of the left end of the exploded perspective showing in Figure 49.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Printer Fluidic System

[0214] Figure 1 is a schematic overview of the fluidic system used by the print engine described in Figures 2A and 2B. As previously discussed, the print engine has the key mechanical structures of an inkjet printer. The peripheral structures such as the outer casing, the paperfeed tray, paper collection tray and so on are configured to suit the specific printing requirements of the printer (for example, the photo printer, the network printer or Soho printer). The Applicant's photo printer disclosed in the co-pending application USSN 11/688863, is an example of an inkjet printer using a fluidic system according to Figure 1. The contents of this disclosure are incorporated herein by reference. The operation of the system and its individual components are described in detail in USSN 11/872719 the contents of which are incorporated herein by reference.

[0215] Briefly, the printer fluidic system has a printhead assembly 2 supplied with ink from an ink tank 4 via an upstream ink line 8. Waste ink is drained to a sump 18 via a downstream ink line 16. A single ink line is shown for simplicity. In reality, the printhead has multiple ink lines for full colour printing. The upstream ink line 8 has a shut off valve 10 for selectively isolating the printhead assembly 2 from the pump 12 and or the ink tank 4. The pump 12 is used to actively prime or flood the printhead assembly 2. The pump 12 is also used to establish a negative pressure in the ink tank 4. During printing, the negative pressure is maintained by the bubble point regulator 6.

[0216] The printhead assembly 2 is an LCP (liquid crystal polymer) molding 20 supporting a series of printhead ICs 30 secured with an adhesive die attach film (not shown). The printhead ICs 30 have an array of ink ejection nozzles for ejecting drops of ink onto the passing media substrate 22. The nozzles are MEMS (micro electro-mechanical) structures printing at true 1600 dpi resolution (that is, a nozzle pitch of 1600 npi), or greater. The fabrication and structure of suitable printhead IC's 30 are described in detail in USSN 11/246687, the contents of which are incorporated by reference. The LCP molding 20 has a main channel 24 extending between the inlet 36 and the outlet 38. The main channel 24 feeds a series of fine channels 28 extending to the underside of the LCP molding 20. The fine channels 28 supply ink to the printhead ICs 30 through laser ablated holes in the die attach film.

[0217] Above the main channel 24 is a series of non-priming air cavities 26. These cavities 26 are designed to trap a pocket of air during printhead priming. The air pockets give the system some compliance to absorb and damp pressure spikes or hydraulic shocks in the ink. The printers are high speed pagewidth printers with a large number of nozzles firing rapidly. This consumes ink at a fast rate and suddenly ending a print job, or even just the end of a page, means that a column of ink moving towards (and through) the printhead assembly 2 must be brought to rest almost instantaneously. Without the compliance provided by the air cavities 26, the momentum of the ink would flood the nozzles in the printhead ICs 30. Furthermore, the subsequent 'reflected wave' can generate a negative pressure strong enough to deprime the nozzles.

Print Engine

[0218] Figure 2A shows a print engine 3 of the type that uses a print cartridge 2. The print engine 3 is the internal structure of an inkjet printer and therefore does not include any external casing, ink tanks or media feed and collection trays. The printhead cartridge 2 is inserted and removed by the user lifting and lowering the latch 126. The print engine 3 forms an electrical connection with contacts on the printhead cartridge 2 and a fluid coupling is formed via the sockets 120 and the inlet and outlet manifolds, 48 and 50 respectively.

[0219] Sheets of media are fed through the print engine by the main drive roller 186 and the exit feed roller 178. The main drive roller 186 is driven by the main drive pulley and encoder disk 188. The exit feed roller 178 is driven by the exit drive pulley 180 which is synchronized to the main drive pulley 188 by the media feed belt 182. The main drive pulley 188 is powered by the media feed motor 190 via the input drive belt 192.

[0220] The main drive pulley 188 has an encoder disk which is read by the drive pulley sensor 184. Data relating to the speed and number of revolutions of the drive shafts 186 and 178 is sent to the print engine controller (or PEC). The PEC (not shown) is mounted to the main PCB 194 (printed circuit board) and is the primary micro-processor for controlling the operation of the printer.

[0221] Figure 2B shows the print engine 3 with the

printhead cartridge removed to reveal the apertures 122 in each of the sockets 120. Each aperture 122 receives one of the spouts 52 (see Figure 5) on the inlet and outlet manifolds. As discussed above, the ink tanks have an arbitrary position and configuration but simply connect to hollow spigots 124 (see Figure 8) at the rear of the sockets 120 in the inlet coupling. The spigot 124 at the rear of the outlet coupling leads to the waste ink outlet in the sump 18 (see Figure 1).

[0222] Reinforced bearing surfaces 128 are fixed to the pressed metal casing 196 of the print engine 3. These provide reference points for locating the printhead cartridge within the print engine. They are also positioned to provide a bearing surface directly opposite the compressive loads acting on the cartridge 2 when installed. The fluid couplings 120 push against the inlet and outlet manifolds of the cartridge when the manifold spouts (described below) open the shut off valves in the print engine (also described below). The pressure of the latch 126 on the cartridge 2 is also directly opposed by a bearing surface 128. Positioning the bearing surfaces 128 directly opposite the compressive loads in the cartridge 2, the flex and deformation in the cartridge is reduced. Ultimately, this assists the precise location of the nozzles relative to the media feed path. It also protects the less robust structures within the cartridge from damage.

Printhead Cartridge

[0223] Figure 3 is a perspective of the complete printhead cartridge 2. The printhead cartridge 2 has a top molding 44 and a removable protective cover 42. The top molding 44 has a central web for structural stiffness and to provide textured grip surfaces 58 for manipulating the cartridge during insertion and removal. The base portion of the protective cover 42 protects the printhead ICs (not shown) and line of contacts (not shown) prior to installation in the printer. Caps 56 are integrally formed with the base portion and cover the ink inlets and outlets (see 54 and 52 of Fig. 5).

[0224] Figure 4 shows the printhead assembly 2 with its protective cover 42 removed to expose the printhead ICs on the bottom surface and the line of contacts 33 on the side surface. The protective cover is discarded to the recycling waste or fitted to the printhead cartridge being replaced to contain leakage from residual ink. Figure 5 is a partially exploded perspective of the printhead assembly 2. The top cover 44 has been removed reveal the inlet manifold 48 and the outlet manifold 50. The inlet and outlet shrouds 46 and 47 have been removed to better expose the five inlet and outlet spouts (52 and 54). The inlet and outlet manifolds 48 and 50 form a fluid connection between each of the individual inlets and outlets and the corresponding main channel (see 24 in Figure 6) in the LCP molding. The main channel extends the length of the LCP molding and it feeds a series of fine channels on the underside of the LCP molding. A line of air cavities 26 are formed above each of the main channels 24. As explained above in relation to Figure 1, any shock waves or pressure pulses in the ink are damped by compressing the air the air cavities 26.

[0225] Figure 6 is an exploded perspective of the printhead assembly without the inlet or outlet manifolds or the top cover molding. The main channels 24 for each ink color and their associated air cavities 26 are formed in the channel molding 68 and the cavity molding 72 respectively. Adhered to the bottom of the channel molding 68 is a die attach film 66. The die attach film 66 mounts the printhead ICs 30 to the channel molding such that the fine channels on the underside of the channel molding 68 are in fluid communication with the printhead ICs 30 via small laser ablated holes through the film.

[0226] Both the channel molding 68 and the top cover molding 72 are molded from LCP (liquid crystal polymer) because of its stiffness and coefficient of thermal expansion that closely matches that of silicon. It will be appreciated that a relatively long structure such as a pagewidth printhead should minimize any thermal expansion differences between the silicon substrate of the printhead ICs 30 and their supporting structure.

Printhead Maintenance Carousel

[0227] Referring to Figure 7, a sectioned perspective view is shown. The section is taken through line 7-7 shown in Figure 2A. The printhead cartridge 2 is inserted in the print engine 3 such that its outlet manifold 50 is open to fluid communication with the spigot 124 which leads to a sump in the completed printer (typically situated at the base the print engine). The LCP molding 20 supports the printhead ICs 30 immediately adjacent the media feed path 22 extending through the print engine.

[0228] On the opposite side of the media feed path 22 is the printhead maintenance carousel 150 and its associated drive mechanisms. The printhead maintenance carousel 150 is mounted for rotation about the tubular drive shaft 156. The maintenance carousel 150 is also configured for movement towards and away from the printhead ICs 30. By raising the carousel 150 towards the printhead ICs 30, the various printhead maintenance stations on the exterior of the carousel are presented to the printhead. The maintenance carousel 150 is rotatably mounted on a lift structure 170 that is mounted to a lift structure shaft 156 such that it can pivot relative to the remainder of the print engine 3. The lift structure 170 includes a pair of lift arms 158 (only one lift arm is shown, the other being positioned at the opposite end of the lift structure shaft 156). Each lift arm 158 has a cam engaging surface 168, such as a roller or pad of low friction material. The cams (described in more detail below) are fixed to the carousel drive shaft 160 for rotation therewith. The lift arms 158 are biased into engagement with the cams on the carousel lift drive shaft 160, such that the carousel lift motor (described below) can move the carousel towards and away from the printhead by rotating the shaft 160.

[0229] The rotation of the maintenance carousel 150 about the tubular shaft 166 is independent of the carousel lift drive. The carousel drive shaft 166 engages the carousel rotation motor (described below) such that it can be rotated regardless of whether it is retracted from, or advanced towards, the printhead. When the carousel is advanced towards the printhead, the wiper blades 162 move through the media feed path 22 in order to wipe the printhead ICs 30. When retracted from the printhead, the carousel 150 can be repeatedly rotated such that the wiper blades 162 engage the doctor blade 154 and the cleaning pad 152. This is also discussed in more detail below.

[0230] Referring now to Figure 8, the cross section 7-7 is shown in elevation to better depict the maintenance carousel lift drive. The carousel lift drive shaft 160 is shown rotated such that the lift cam 172 has pushed the lift arms 158 downwards via the cam engaging surface 168. The lift shaft 160 is driven by the carousel lift spur gear 174 which is in turn driven by the carousel lift worm gear 176. The worm gear 176 is keyed to the output shaft of the carousel lift motor (described below).

[0231] With the lift arms 158 drawing the lift structure 170 downwards, the maintenance carousel 150 is retracted away from the printhead ICs 30. In this position, the carousel 150 can be rotated with none of the maintenance stations touching the printhead ICs 30. It does, however, bring the wiper blades 162 into contact with the doctor blade 154 and the absorbent cleaning pad 152.

Doctor Blade

[0232] The doctor blade 154 works in combination with the cleaning pad 152 to comprehensively clean the wiper blades 162. The cleaning pad 152 wipes paper dust and dried ink from the wiping contact face of the wiper blades 162. However, a bead of ink and other contaminants can form at the tip of the blades 162 where it does not contact the surface of the cleaning pad 152.

[0233] To dislodge this ink and dust, the doctor blade 154 is mounted in the print engine 3 to contact the blades 162 after they have wiped the printhead ICs 30, but before they contact the cleaning pad 152. Upon contact with the doctor blade 154, the wiper blades 162 flex into a curved shaped in order to pass. As the wiper blades 162 are an elastomeric material, they spring back to their quiescent straight shape as soon as they disengage from the doctor blade 154. Rapidly springing back to their quiescent shape projects dust and other contaminants from the wiper blade 162, and in particular, from the tip.

[0234] The ordinary worker will appreciate that the wiper blades 162 also flex when they contact the cleaning pad 152, and likewise spring back to their quiescent shapes once disengaged from the pad. However, the doctor blade 154 is mounted radially closer to the central shaft 166 of the carousel 150 than the cleaning pad 152. This bends the wiper blades 162 more as they pass, and so imparts more momentum to the contaminants when springing back to the quiescent shape. It is not possible to simply move the cleaning pad 152 closer to the carousel shaft 166 to bend the wiper blades 162 more, as the trailing blades would not properly wipe across the cleaning pad 152 because of contact with the leading blades.

Cleaning Pad

[0235] The cleaning pad 152 is an absorbent foam body formed into a curved shape corresponding to the circular path of the wiper blades 162. The pad 152 cleans more effectively when covered with a woven material to provide a multitude of densely packed contacts points when wiping the blades. Accordingly, the strand size of the woven material should be relatively small; say less than 2 deniers. A microfiber material works particularly well with a strand size of about 1 denier.

[0236] The cleaning pad 152 extends the length of the wiper blades 162 which in turn extend the length of the pagewidth printhead. The pagewidth cleaning pad 152 cleans the entire length of the wiper blades simultaneously which reduces the time required for each wiping operation. Furthermore the length of the pagewidth cleaning pad inherently provides a large volume of the absorbent material for holding a relatively large amount of ink. With a greater capacity for absorbing ink, the cleaning pad 152 will be replaced less frequently.

Capping the Printhead

[0237] Figure 9 shows the first stage of capping the printhead ICs 30 with the capping maintenance station 198 mounted to the maintenance carousel 150. The maintenance carousel 150 is retracted away from the printhead ICs 30 as the lift cam 172 pushes down on the lift arms 158. The maintenance carousel 150, together with the maintenance encoder disk 204, are rotated until the first carousel rotation sensor 200 and the second carousel rotation sensor 202 determine that the printhead capper 198 is facing the printhead ICs 30.

[0238] As shown in Figure 10, the lift shaft 160 rotates the cam 172 so that the lift arms 158 move upwards to advance the maintenance carousel 150 towards the printhead ICs 30. The capper maintenance station 198 engages the underside of the LCP moldings 20 to seal the nozzles of the printhead ICs 30 in a relatively humid environment. The ordinary worker will understand that this prevents, or at least prolongs, the nozzles from drying out and clogging.

Uncapping the Printhead

[0239] Figure 11 shows the printhead ICs 30 being uncapped in preparation for printing. The lift shaft 160 is rotated so that the lift cam 172 pushes the carousel lift arms 158 downwards. The capping maintenance station 198 moves away from the LCP molding 20 to expose the

printhead ICs 30.

Wiping the Printhead

[0240] Figure 12 shows the printhead ICs 30 being wiped by the wiper blades 162. As the capping station 198 is rotated away from the printhead, the blades of the wiper member 162 contact the underside of the LCP molding 20. As the carousel 150 continues to rotate, the wiper blades and drawn across the nozzle face of the printhead ICs 30 to wipe away any paper dust, dried ink or other contaminants. The wiper blades 162 are formed from elastomeric material so that they resiliently flex and bend as they wipe over the printhead ICs 30. As the tip of each wiper blade is bent over, the side surface of each blade comes into wiping contact with the nozzle face. It will be appreciated that the broad flat side surface of the blades has greater contact with the nozzle face and is more effective at cleaning away contaminants.

Wiper Blade Cleaning

[0241] Figures 13 and 14 show the wiper blades 162 being cleaned. As shown in Figure 13, immediately after wiping the printhead ICs 30, the wiper blades 162 are rotated past the doctor blade 154. The function of the doctor blade 154 is discussed in greater detail above under the subheading "Doctor Blade".

[0242] After dragging the wiper blades 162 past the doctor blade 154, any residual dust and contaminants stuck to the blades is removed by the absorbent cleaning pad 152. This step is shown in Figure 14.

[0243] During this process the print platen maintenance station 206 is directly opposite the printhead ICs 30. If desired, the carousel can be lifted by rotation of the lift cam 172 so that the nozzles can fire into the absorbent material 208. Any colour mixing at the ink nozzles is immediately purged. Holes (not shown) drilled into the side of the tubular chassis 166 provides a fluid communication between the absorbent material 208 and the porous material 210 within the central cavity of the carousel shaft 166. Ink absorbed by the material 208 is drawn into, and retained by, the porous material 210. To drain the porous material 210, the carousel 150 can be provided with a vacuum attachment point (not shown) to draw the waste ink away.

[0244] With the wiper blades clean, the carousel 150 continues to rotate (see Figure 15) until the print platen 206 is again opposite the printhead ICs 30. As shown in Figure 16, the carousel is then lifted towards the printhead ICs 30 in readiness for printing. The sheets of media substrate are fed along the media feed path 22 and past the printhead ICs 30. For full bleed printing (printing to the very edges of the sheets of media), the media substrate can be held away from the platen 206 so that it does not get smeared with ink overspray. It will be understood that the absorbent material 208 is positioned within a recessed portion of the print platen 206 so that any overspray ink (usually about one millimetre either side of the paper edges) is kept away from surfaces that may contact the media substrate.

[0245] At the end of the print job or prior to the printer going into standby mode, the carousel 150 is retracted away from the printhead ICs 30 in rotated so that the printhead capping maintenance station 198 is again presented to the printhead. As shown in Figure 17, the lift shaft 160 rotates the lift cam so that the lift arms 158 move the printhead capping maintenance station 198 into sealing engagement with the underside of the LCP molding 20.

Printhead Maintenance Carousel

[0246] Figures 18, 19, 20 and 21 show the maintenance carousel in isolation. Figure 18 is a perspective view showing the wiper blades 162 and print platen 206. Figure 19 is a perspective view showing the printhead capper 198 and the wiper blades 162. Figure 20 is an exploded perspective showing the component parts of the maintenance carousel, and Figure 21 is a section view showing the component parts fully assembled.

[0247] The maintenance carousel has four printhead maintenance stations; a print platen 206, a wiper member 162, a printhead capper 198 and a spittoon/blotter 220. Each of the maintenance stations is mounted to its own outer chassis component. The outer chassis components fit around the carousel tubular shaft 166 and interengage each other to lock on to the shaft. At one end of the tubular shaft 166 is a carousel encoder disk 204 and a carousel spur gear 212 which is driven by the carousel rotation motor (not shown) described below. The tubular shaft is fixed to the spur gear or rotation therewith. The printhead maintenance stations rotate together with the tubular shaft by virtue of their firm compressive grip on the shaft's exterior.

[0248] The wiper blade outer chassis component 214 is an aluminium extrusion (or other suitable alloy) configured to securely hold the wiper blades 162. Similarly, the other outer chassis components are metal extrusions for securely mounting the softer elastomeric and or absorbent porous material of their respective maintenance stations. The outer chassis components for the print platen 216 and the printhead capper 198 have a series of identical locking lugs 226 along each of the longitudinal edges. The wiper member outer chassis component 214 and the spittoon/blotter outer chassis component 218 have complementary bayonet style slots for receiving the locking lugs 226. Each of the bayonet slots has a lug access aperture 228 adjacent a lug locking slot 230. Inserting the locking lugs 226 into the lug access aperture 228 of the adjacent outer chassis component, and then longitudinally sliding the components relative to each other will lock them on to the chassis tubular shaft 166.

[0249] To improve the friction, and therefore the locking engagement, between each of the maintenance stations and the chassis chip shaft 166, each of the printhead

maintenance stations have an element with a curved shaft engagement surface 234. The print platen 206 has an absorbent member 224 with a curved shaft engagement surface 234 formed on one side. The spittoon/blotter outer chassis component 218 has a relatively large absorbent spittoon/blotter member 220 which also has a curved shaft engagement surface 234 formed on its interior face. Likewise, the outer chassis component for the printhead capper 198, and the common base of the wiper blades 162 work has curved shaft engagement surfaces 234.

[0250] The ordinary worker will appreciate that clamping the outer chassis to the inner chassis with the use of interengaging locking formations minimises the amount of machining and assembly time while maintaining fine tolerances for precisely mounting the maintenance station structures. Furthermore, the outer chassis components can be assembled in different configurations. The wiper blade outer chassis component 214 can change positions with the spittoon/blotter chassis component 218. Similarly, the printhead capper 198 can swap with the print platen 206. In this way the maintenance station can be assembled in a manner that is optimised for the particular printer in which it will be installed.

Injection Molded Polymer Carousel Chassis

[0251] Figures 22 to 28 show another embodiment of the printhead maintenance carousel. These figures are schematic cross sections showing only the carousel and the lower portion of the printhead cartridge. It will be appreciated that the maintenance drive systems require simple and straightforward modifications in order to suit this embodiment of the carousel.

[0252] Figure 22 shows the LCP molding 20 of the printhead cartridge 2 adjacent the printhead maintenance carousel 150 with the print platen 206 presented to the printhead ICs 30. For clarity, Figure 29 shows the print platen 206 in isolation. In use, sheets of media substrate are fed along the media feed path 22. Between the nozzles of the printhead ICs 30 and the media feed path 22 is a printing gap 244. To maintain print quality, the gap 244 between the printhead IC nozzle face and the media surface should as close as possible to the nominal values specified during design. In commercially available printers this gap is about two millimetres. However, as print technology is refined, some printers have a printing gap of about one millimetre.

[0253] With the widespread popularity of digital photography, there is increasing demand for full bleed printing of colour images. "Full bleed printing" is printing to the very edges of the media surface. This will usually cause some "over spray" where ejected ink misses the edge of the media substrate and deposits on the supporting print platen. This over spray ink can then smear onto subsequent sheets of media.

[0254] The arrangement shown in Figure 22 deals with both these issues. The paper guide 238 on the LCP molding 20 defines the printing gap 244 during printing. However the print platen 206 has a guide surface 246 formed on its hard plastic base molding. The guide surface 246 directs the leading edge of the sheets towards the exit drive rollers or other drive mechanism. With minimal contact between the sheets of media and print platen 206, there is a greatly reduced likelihood of smearing from over sprayed ink during full bleed printing. Furthermore, placing the paper guide 238 on the LCP molding 20 immediately adjacent the printhead ICs 30 accurately maintains the gap 244 from the nozzles to the media surface.

[0255] Some printers in the Applicant's range use this to provide a printing gap 244 of 0.7 millimetres. However this can be further reduced by flattening the bead of encapsulant material 240 adjacent the printhead ICs 30. Power and data is transmitted to the printhead ICs 30 by the flex PCB 242 mounted to the exterior of the LCP molding 20. The contacts of the flex PCB 242 are electrically connected to the contacts of the printhead ICs 30 by a line of wire bonds (not shown). To protect the wire bonds, they are encapsulated in an epoxy material referred to as encapsulant. The Applicant has developed several techniques for flattening the profile of the wire bonds and the bead of encapsulant 240 covering them. This in turn allows the printing gap 244 to be further reduced.

[0256] The print platen 206 has an indentation or central recessed portion 248 which is directly opposite the nozzles of the printhead ICs 30. Any over spray ink will be in this region of the platen 206. Recessing this region away from the remainder of the platen ensures that the media substrate will not get smeared with wet over spray ink. The surface of the central recessed 248 is in fluid communication with an absorbent fibrous element 250. In turn, the fibrous element 250 is in fluid communication with porous material 254 in the centre of the chassis 236 by capillary tubes 252. Over sprayed ink is wicked into the fibrous element 250 and drawn into the porous material 254 by capillary action through the tubes 252.

[0257] Figure 23 shows the carousel 150 rotated such that the printhead priming station 262 is presented to the printhead ICs 30. Figure 30 shows the printhead priming station 272 and its structural features in isolation. The printhead priming station has an elastomeric skirt 256 surrounding a priming contact pad 258 formed of porous material. The elastomeric skirt and the priming contact pad are co-molded together with a rigid polymer base 260 which securely mounts to the injection molded chassis 236.

[0258] Whenever the printhead cartridge 2 is replaced, it needs to be primed with ink. Priming is notoriously wasteful as the ink is typically forced through the nozzles until the entire printhead structure has purged any air bubbles. In the time it takes for the air to be cleared from the multitude of conduits extending through the printhead, a significant amount of ink has been wasted.

[0259] To combat this, the maintenance carousel 150 is raised so that the priming contact pad 258 covers the

nozzles of the printhead ICs 30. Holding the contact pad 258 against the nozzle array as it is primed under pressure significantly reduces the volume of ink purged through the nozzles. The porous material partially obstructs the nozzles to constrict the flow of ink. However the flow of air out of the nozzles is much less constricted, so the overall priming process is not delayed because of the flow obstruction generated by the porous material. The elastomeric skirt 256 seals against the underside of the LCP molding 22 to capture any excess ink that may flow from the sides of the contact pad 258. Flow apertures 264 formed in the rigid polymer base 260 allows the ink absorbed by the pad 258 and any excess ink to flow to the absorbent fibrous element 250 (identical to that used by the print platen 206). As with the print platen 206, ink in the fibrous element 250 is drawn into the porous material 254 within the injection molded chassis 236 by the capillary tubes 252.

[0260] By using the printhead priming station 262, the amount of wasted ink is significantly reduced. Without the priming station, the volume of ink wasted when priming the pagewidth printhead is typically about two millilitres per colour. With the priming station 262, this is reduced to 0.1 millilitres per colour.

[0261] The priming contact pad 258 need not be formed of porous material. Instead, the pad can be formed from the same elastomeric material as the surrounding skirt 256. In this case, the contact pad 258 needs to have a particular surface roughness. The surface that engages the nozzle face of the printhead ICs 30, should be rough at the 2 to 4 micron scale, but smooth and compliant at the 20 micron scale. This type of surface roughness allows air to escape from between the nozzle face and contact pad, but only a small amount of ink.

[0262] Figure 24 shows the maintenance carousel 150 with the wiping station 266 presented to the printhead ICs 30. The wiping station is shown in isolation in Figure 31. The wiping station 266 is also a co-molded structure with the soft elastomeric wiper blades 268 supported on a hard plastic base 270. To wipe the nozzle face of the printhead ICs 30, the carousel chassis 236 is raised and then rotated so that the wiper blades 268 wipe across the nozzle face. Ordinarily, the carousel chassis 236 is rotated so that the wiper blades 268 wipe towards the encapsulation bead 240. As discussed in the Applicant's co-pending application USSN (our docket RRE015US) incorporated by cross-reference above, the encapsulant bead 240 can be profiled to assist the dust and contaminants to lodge on the face of the wiper blade 268. However, the maintenance drive (not shown) can easily be configured to rotate the chassis 236 in both directions if wiping in two directions proves more effective. Similarly, the number of wipes across the printhead ICs 30 is easily varied by changing the number of rotations the maintenance drive is programmed to perform for each wiping operation.

[0263] In Figure 25, the maintenance carousel 150 is shown with the printhead capper 272 presented to the printhead ICs 30. Figure 32 shows the capper in isolation to better illustrate its structure. The capper 272 has a perimeter seal 274 formed of soft elastomeric material. The perimeter seal 274 is co-molded with its hard plastic base 276. The printhead capper 272 reduces the rate of nozzle drying when the printer is idle. The seal between the perimeter seal 274 and the underside of the LCP molding 20 need not be completely air tight as the capper is being used to prime printhead using a suction force. In fact the hard plastic base 276 should include an air breather hole 278 so that the nozzles do not flood by the suction caused as the printhead is uncapped. To cap the printhead, the chassis 236 is rotated until the printhead capper 272 is presented to the printhead ICs 30. The chassis 236 is then raised until the perimeter seal 274 engages the printhead cartridge 2.

[0264] Figure 26 shows the inclusion of the wiper blade cleaning pad 152. As with the first embodiment described above, the cleaning pad 152 is mounted in the printer so that the wiper blades 268 move across the surface of the pad 152 as the maintenance carousel 150 is rotated. By positioning the cleaning pad 152 such that the chassis 236 needs to be retracted from the printhead ICs 30 in order to allow the wiper blades 268 to contact pad, the chassis 236 can be rotated at relatively high speeds for a comprehensive clean of the wiper blades 268 while not risking any damaging contact with the printhead ICs 30. Furthermore the cleaning pad 152 can be wetted with a surfactant to better remove contaminants from the wiper blades surface.

[0265] Figure 27 shows the injection molded chassis 236 in isolation. The chassis is symmetrical about two planes extending through the central longitudinal axis 282. This symmetry is important because an injection molded chassis extending the length of pagewidth printhead, is prone to deform and bend as it cools if the cross section is not symmetrical. With a symmetrical cross-section, the shrinkage of the chassis is it cools is also symmetrical.

[0266] The chassis 236 has four maintenance station mounting sockets 276 formed in its exterior surface. The sockets 276 are identical so that they can receive any one of the various maintenance stations (206, 266, 262, 272). In this way the maintenance stations become interchangeable modules and the order which the maintenance stations are presented to the printhead can be changed to suit different printers. Furthermore, if the maintenance stations themselves are modified, their standard sockets ensure they are easily incorporated into the existing production line with a minimum of retooling. The maintenance stations are secured in the sockets with adhesive but other methods such as an ultra sonic spot weld or mechanical interengagement would also be suitable.

[0267] As shown in Figure 28, the mold has four sliders 278 and a central core 288. Each of the sliders 278 has columnar features 280 to form the conduits connecting the fibrous wicking pads to the porous material 219 in

the central cavity. The line of draw for each slider is radially outwards from the chassis 236 while the core 288 is withdrawn longitudinally (it will be appreciated that the core is not a precisely a cylinder, but a truncated cone to provide the necessary draft). Injection molding of polymer components is very well suited to high-volume, low-cost production. Furthermore, the symmetrical structure of the chassis and uniform shrinkage maintain good tolerances to keep the maintenance stations extending parallel to the printhead ICs. However, other fabrication techniques are possible; for example, shock wave compressed polymer powder or similar. Furthermore, a surface treatment to increase hydrophillicity can assist the flow of ink to the capillary tubes 252 and ultimately the porous material 210 within the chassis 236. In some printer designs, the chassis is configured for connection to a vacuum source to periodically drain ink from the porous material 210.

Five Maintenance Station Embodiment

[0268] Figure 34 shows an embodiment of the printhead maintenance carousel 150 with five different maintenance stations: a print platen 206, a printhead wiper 266, a printhead capper 272, a priming station 262 and a spittoon 284. The spittoon 284 (shown in isolation in Figure 33) has a relatively simple structure - the spittoon face 284 presents flat to the printhead and has apertures (not shown) for fluid communication with the fibrous element 250 retained in its hard plastic base.

[0269] The five station maintenance carousel 150 adds a spittoon 284 to allow the printer to use major ink purges as part of the maintenance regime. The four station carousel of Figures 22-25, will accommodate minor ink purges or 'spitting cycles' using the print platen 206 and or the capper 272. A minor spitting cycle is used after a nozzle face wipe or as an inter-page spit during a print job to keep the nozzles wet. However, in the event that the printhead needs to be recovered from deprime, gross color mixing, large-scale nozzle drying and so on, it is likely that a major spitting cycle will be required - one which is beyond the capacity of the platen or the capper.

[0270] The spittoon 284 has large apertures in its face 286 or a series of retaining ribs to hold the fibrous wicking material 250 in the hard plastic base. This keeps the fibrous element 250 very open to a potentially dense spray of ink. One face of the fibrous element 250 presses against the capillary tubes 252 to enhance the flow to the porous material 254 in the central cavity of the chassis 236.

[0271] The five socket chassis 236 is injection molded using five sliders configured at 72 degrees to each other, or six sliders at 60 degrees to each other. Similarly, a maintenance carousel with more than five stations is also possible. If the nozzle face is prone to collecting dried ink, it can be difficult to remove with a wiper alone. In these situations, the printer may require a station (not shown) for jetting ink solvent or other cleaning fluid onto the nozzle face. This can be incorporated instead of, or in addition to the spittoon.

Wiper Variants

[0272] Figure 35 to 46 show a range of different structures that the wiper can take. Wiping the nozzle face of printhead is an effective way of removing paper dust, ink floods, dried ink or other contaminants. The ordinary worker will appreciate that countless different wiper configurations are possible, of which, the majority will be unsuitable for any particular printer. The functional effectiveness of wiper (in terms of cleaning the printhead) must be weighed against the production costs, the intended operational life, the size and weight constraints and other considerations.

Single Contact Blade

[0273] Figure 35 shows a wiper maintenance station 266 with a single elastomeric blade 290 mounted in the hard plastic base 270 such that it extends normal to the media feed direction. A single wiper blade extending the length of the nozzle array is a simple wiping arrangement with low production and assembly costs. In light of this, a single blade wiper is suited to printers and the lower end of the price range. The higher production volumes favor cost efficient manufacturing techniques and straightforward assembly of the printer components. This may entail some compromise in terms of the operational life of the unit, or the speed and efficiency with which the wiper cleans the printhead. However the single blade design is compact and if it does not effectively clean the nozzle face in a single traverse, the maintenance drive can simply repeat the wiping operation until the printhead is clean.

Multiple Contact Blades

[0274] Figures 36, 43A, 43 and 46 show wiper maintenance stations 266 with multiple, parallel blades. In Figure 36, the twin parallel blades 292 are identical and extend normal to the media feed direction. Both blades 292 are separately mounted to the hard plastic base 270 so as to operate independently. In Figure 46, the blades are non-identical. The first and second blades (294 and 296 respectively) are different widths (or otherwise different cross sectional profiles) and durometer values (hardness and viscoelasticity). Each blade may be optimised to remove particular types of contaminant. However, they are separately mounted in the hard plastic base 270 for independent operation. In contrast, the multiple blade element of Figures 43A and 43B has smaller, shorter blades 300 all mounted to a common elastomeric base 298, which is in turn secured to the hard plastic base 270. This is a generally more compliant structure that has a relatively large surface area in contact with the nozzle face with each wipe. However, the thin soft blades wear

and perish at a greater rate than the larger and more robust blades.

[0275] With multiple parallel blades wiping across the nozzle face, a single traverse by the wiper member will collect more of the dust and contaminants. While a multiple blade design is less compact than a single blade, each wiping operation is quicker and more effective. Hence the printhead can be wiped between pages during the print job and any preliminary maintenance regime performed prior to a print job is completed in a short time.

Single Skew Blade

[0276] Figure 37 shows a wiper maintenance station 266 with a single blade 302 mounted in the hard plastic base 270 such that it is skew to the wiping direction. It will be appreciated that the wiping direction is normal to the longitudinal extent of the plastic base 270.

[0277] A single wiper blade is a simple wiping arrangement with low production and assembly costs. Furthermore, by mounting the blade so that it is skew to the wiping direction, the nozzle face will be in contact with only one section of blade and any time during the traverse of the wiper member. With only one section in contact with the nozzle face, the blade does not buckle or curl because of inconsistent contact pressure along its full length. This ensures sufficient contact pressure between the wiper blade and all of the nozzle face without needing to precisely line the blade so that it is completely parallel to the nozzle face. This allows the manufacturing tolerances to be relaxed so that higher volume low-cost production techniques can be employed. This may entail some compromise in terms of increasing the distance that the wiper member must travel in order to clean the printhead, and therefore increasing the time required from each wiping operation. However the reduced manufacturing costs outweigh these potential disadvantages.

Independent Contact Blades

[0278] Figure 38 shows a wiper maintenance station 266 with two sectioned blades 304 mounted in the hard plastic base 270. Each of the individual blade sections 306 that make up the complete blades 304 mounted in the hard plastic base 270 for independent movement relative to each other. The individual blade sections 306 in each blade 304 are positioned so that they are out of registration with each other with respect to the wiping direction. In this way, the nozzles that are not wiped by the first blade 304 because they are positioned in a gap between two blade sections 306, will be wiped by a blade section 306 in the second blade 304.

[0279] Wiping the nozzle face of pagewidth printhead with a single long blade can be ineffective. Inconsistent contact pressure between the blade and the nozzle face can cause the blade to buckle or curl at certain sections along its length. In these sections the contact pressure can be insufficient or there maybe no contact between the blade and the nozzle face. A wiper blade divided into individual blade sections can address this problem. Each section is capable of moving relative to its adjacent sections so any inconsistencies in the contact force, will not cause buckling or curling in other sections of blade. In this may contact pressure is maintained at the nozzle face is clean effectively.

Nozzle Face Wiper Having Multiple Skew Blades

[0280] In Figure 39, the wiper maintenance station 266 has a series of independent blades 308 mounted in the hard plastic base 270 such that they are skew to the wiping direction. The blades 308 are positioned so that the lateral extent (with respect the wiping direction) of each blade (X) has some overlap (Z) with the lateral extent of its adjacent blades (Y). By mounting the wiper blade so that it is skew to the wiping direction, the nozzle face will be in contact with only one section of blade and any time during the traverse of the wiper member. With only one section in contact with the nozzle face, the blade does not buckle or curl because of inconsistent contact pressure along its full length. This ensures sufficient contact pressure between the wiper blade and all of the nozzle face without needing to align the blade so that it is precisely parallel to the nozzle face. This allows the manufacturing tolerances to be relaxed so that high volume low-cost production techniques can be employed. A single skew blade will achieve this but it will increase the distance that the wiper member must travel in order to clean the printhead, and therefore increasing the time required from each wiping operation. In light of this, the invention uses a series of adjacent skew blades, each individual blade wiping a corresponding portion of the nozzle array. Multiple blades involve higher manufacturing costs than a single blade but in certain applications, the compact design and quicker operation outweigh these potential disadvantages.

Wiper with Array of Pads

[0281] In Figures 40 and 44 the wiping maintenance stations 266 use an array of contact pads 310 instead of any blade configurations. The individual pads 312 maybe short squad cylinders of an elastomeric material individually mounted into the hard plastic base 270 or a cylindrical soft fibre brush similar to the format often used for silicon wafer cleaning. As discussed above, wiping the nozzle face of pagewidth printhead with a single long contact surface can be ineffective. Inconsistent contact pressure between the wiping surface and the nozzle face can cause the contact pressure to be insufficient or nonexistent in some areas.

[0282] Using a wiping surface that has been divided into an array 310 of individual contact pads allows each pad to move relative to its adjacent pads so any inconsistencies in the contact force will vary the amount each pad compresses and deforms individually. Relatively

high compression of one pad will not necessarily transfer compressive forces to its adjacent pad. In this way, uniform contact pressure is maintained at the nozzle face is cleaned more effectively.

Sinusoidal Blade

[0283] In the wiping maintenance station 266 shown in Figure 41, the single blade 314 is mounted into the hard plastic base 270 such that it follows a sinusoidal path. As previously discussed, wiping the nozzle face of pagewidth printhead with a single long contact surface can be ineffective. Inconsistent contact pressure between the wiping surface and the nozzle face can cause the contact pressure to be insufficient or non-existent in some areas. One of the reasons that the contact pressure will vary is inaccurate movement of the wiper surface relative to the nozzle face. If the support structure for the wiping surface is not completely parallel to the nozzle face over the entire length of travel during the wiping operation, there will be areas of low contact pressure which may not be properly cleaned. As explained in relation to the skew mounted blades, it is possible to avoid this by positioning the wiper blade so that it is angled relative to feed wiping direction and the printhead nozzle face. In this way, only one portion of the wiper blade contacts the nozzle face at any time during the wiping operation. Also, a small angle between the blade and the wiping direction improves the cleaning and effectiveness of the wipe. When the blade moves over the nozzle face at an incline, more contact points between the blade and the nozzle face give better contaminant removal. This ameliorates any problems caused by inconsistent contact pressure but it requires the wiper blade to travel further for each wiping operation. As discussed above, inaccuracies in the movement of wiper surface relative to the nozzle face is a source of insufficient contact pressure. Increasing the length of wiper travel is also counter to compact design.

[0284] Using a wiping blade that has a zigzag or sinusoidal shape wipes the nozzle face with a number wiper sections that are inclined to the media feed direction. This configuration also keeps the length of travel of the wiper member relative to the printhead small enough to remain accurate and compact.

Single Blade with Non-Linear Contact Surface

[0285] Figure 42 shows the wiping maintenance station 266 with a single blade 316 having two linear sections mounted on the hard plastic base 270 at an angle to each other, and skew to the wiping direction. As previously discussed, wiping the nozzle face of pagewidth printhead with a single long contact surface can cause the contact pressure to be insufficient or non-existent in some areas. Angling the blade relative to the wiping direction and the printhead nozzle face means that only one portion of the wiper blade contacts the nozzle face at any time during the wiping operation. This keeps the contact pressure more uniform but it requires the wiper blade to travel further for each wiping operation. As discussed above, inaccuracies in the movement of wiper surface relative to the nozzle face source of insufficient contact pressure. Increasing the length of wiper travel only increases the risk of such inaccuracies.

[0286] By using a wiping surface that has an angled or curved shape so that the majority of the nozzle face is wiped with a wiper section that is inclined to the media feed direction while reducing the length of travel of the wiper member relative to the printhead. The ordinary worker will understand that the contact blade can have a shallow V-shape or U-shape. Furthermore if the leading edge of the blade 318 is the intersection of the two linear sections (or the curved section of the U-shaped blade), the Applicant has found that there is less blade wear because of the additional support provided to the initial point of contact with the nozzle face.

Fibrous Pad

[0287] Figure 45 shows a printhead wiper maintenance station 266 with a fibrous pad 320 mounted to the hard plastic base 270. A fibrous pad 320 is particularly effective for wiping the nozzle face. The pad presents many points of contact with the nozzle face so that the fibres can mechanically engage with solid contaminants and will wick away liquid contaminants like ink floods and so on. However, once the fibrous pad has cleaned the nozzle face, it is difficult to remove the contaminants from the fibrous pad. After a large number of wiping operations, the fibrous pad can be heavily laden with contaminants and may no longer clean the nozzle face effectively. However, printers intended to have a short operational life, or printers that allow the wiper to be replaced, a fibrous pad will offer the most effective wiper.

Combination Wiper Maintenance Stations

[0288] It will be appreciated that some printhead designs will be most effectively cleaned by a wiper that has a combination of the above wiping structures. For example a single blade in combination with a series of skew blades, or a series of parallel blades with a fibrous pad in between. The combination wiper maintenance station can be derived by choosing the specific wiping structures on the basis of their individual merits and strength.

Printhead Maintenance Facility Drive System

[0289] Figures 47 to 50 show the media feed drive and the printhead maintenance drive in greater detail. Figure 48 shows the printhead maintenance carousel 150 and the drive systems in isolation. The maintenance carousel 150 is shown with the wiper blades 162 presented to the printhead (not shown). The perspective shown in Figure 48 reveals the paper exit guide 322 leading to the exit

drive roller 178. On the other side of the wiper blades 162 the main drive roller shaft 186 is shown extending from the main drive roller pulley 330. This pulley is driven by the main drive roller belt 192 which engages the media feed motor 190. The media feed drive belt 182 synchronises the rotation of the main drive roller 186 and the exit roller 178.

[0290] The exploded perspective in Figure 49 shows the individual components in greater detail. In particular, this perspective best illustrates the balanced carousel lift mechanism. The carousel lift drive shaft 160 extends between two identical carousel lift cams 172. One end of the carousel lift shaft 160 is keyed to the carousel lift spur gear 174. The spur gear 174 meshes with the worm gear 176 driven by the carousel lift motor 324. The carousel lift rotation sensor 334 provides feedback to the print engine controller (not shown) which can determine the displacement of the carousel from the printhead by the angular displacement of the cams 172.

[0291] The carousel lift cams 172 contact respective carousel lift arms 158 via the cam engaging rollers 168 (it will be appreciated that the cam engaging rollers could equally be a surface of low friction material such as high density polyethylene-HDPE). As the cams 172 are identical and identically mounted to the carousel lift shaft 160 the displacement of the carousel lift arms 158 is likewise identical. Figure 47 is a section view taken along line 7-7 of Figure 2A with the printhead cartridge 2 removed and the printhead maintenance carousel 150 also removed. This figure provides a clear view of the carousel lift spur gear 174, its adjacent lift cam 172 and the corresponding carousel lift arm 158. As the lift arms 158 are equidistant from the midpoint of the carousel 150, the carousel lift drive is completely balanced and symmetrical when lifting and lowering the carousel. This serves to keep the various printhead maintenance stations parallel to the longitudinal extent of the printhead ICs.

[0292] The carousel rotation drive is best illustrated in the enlarged exploded partial perspective of Figure 50. The carousel rotation motor 326 is mounted to the side of the carousel lift structure 170. The stepper motor sensor 328 provides feedback to the print engine controller (PEC) regarding the speed and rotation of the motor 326. The carousel rotation motor 326 drives the idler gear 332 which in turn, drives the reduction gear (not shown) on the obscured side of the carousel lift structure 170. The reduction gear meshes with the carousel spur gear 212 which is keyed to the carousel chassis for rotation therewith.

[0293] As the carousel rotation and the carousel lift the controlled by a separate independent drives, each drive powered by a stepper motor that provides the PEC with with feedback as to motor speed and rotation, the printer has a broad range of maintenance procedures from which to choose. The carousel rotation motor 326 can be driven in either direction and at the variable speeds. Accordingly the nozzle face can be wiped in either direction and the wiper blades can be cleaned against the absorbent pad 152 in both directions. This is particularly useful if paper dust or other contaminants passed to the nozzle face because of a mechanical engagement with the surface irregularity on the nozzle face. Wiping in the opposite direction will often dislodge such mechanical engagements. It is also useful to reduce the speed of the wiper blades 162 as they come into contact with the nozzle face and then increase speed once the blades have disengaged the nozzle face. Indeed the wiper blades 162 can slow down for initial contact with the nozzle face and subsequently increase speed while wiping.

[0294] Similarly, the wiper blades 162 can be moved past the doctor blade 154 at a greater speed than the blades are moved over the cleaning pad 152. The blades 162 can be wiped in both directions with any number of revolutions in either direction. Furthermore the order in which the various maintenance stations are presented to the printhead can be easily programmed into the PEC and or left to the discretion of the user.

[0295] The present invention has been described herein by way of example only. The ordinary worker will readily recognise many variations and modifications which do not depart from the spirit and scope of the broad inventive concept.

[0296] Furthermore, one or more aspects of the following numbered clauses may describe and relate to further aspects or features within the context of the present teaching:

1. A printhead cartridge for an inkjet printer, inkjet printer having a ink reservoir for supplying ink to the printhead cartridge and waste ink outlet for receiving ink from the printhead cartridge; the printhead cartridge comprising: a cartridge body configured the user insertion and removal from the inkjet printer; a pagewidth printhead and the cartridge body, the pagewidth printhead defining an array of nozzles for ejecting ink onto a media substrate; a first fluid coupling for fluid communication between the pagewidth printhead and the ink reservoir; and, a second fluid coupling for fluid communication between the pagewidth printhead and the waste ink outlet; wherein during use, the first and second fluid couplings establish fluid communication with the ink tank and the waste ink outlet respectively, upon insertion of the cartridge body in the inkjet printer.

2. A printhead cartridge according to clause 1 wherein the first fluid coupling has an interface plate supporting a plurality of spouts positioned for sealed engagement with corresponding apertures in a complementary socket on the printer in order to establish fluid communication with a corresponding plurality of ink tanks containing different types of ink such that each of the plurality of spouts is supplied with one of the different types of ink respectively.

3. A printhead cartridge according to clause 2 where-

in the interface plate has surface formations individually associated with each of the spouts respectively, the surface formations defining preferred flow path along the interface plate for any residual ink draining away from the spouts under gravity, the preferred flow paths being configured to avoid any other spouts.

4. A printhead cartridge according to clause 3 wherein the surface formations are grooves in the interface plate. 5. A printhead cartridge according to clause 4 wherein the spouts are arranged in a circular formation on the interface plate.

6. A printhead cartridge according to clause 4 wherein the grooves extend in a generally vertical direction when the printhead cartridge is oriented as will be when installed, the grooves deviating from generally vertical to avoid one of the spouts of a different ink type.

7. A printhead cartridge according to clause 4 wherein each of the spouts have an end formation configured to engage the shut off valve in the complementary socket on the printer, the end formation being configured to open the shut off valve upon installation of the printhead cartridge in the printer.

8. A printhead cartridge according to clause 7 wherein each of the spouts have at least one aperture in a side wall for establishing fluid communication with the pagewidth printhead.

9. A printhead cartridge according to clause 1 wherein the cartridge body has an elongate structure with a plurality of longitudinally extending channels, each of the longitudinally extending channels being for one of the different types of ink supply to the printhead by the respective spouts of the first fluid coupling.

10. A printhead cartridge according to clause 9 wherein the pagewidth printhead has a plurality of printhead ICs mounted to the elongate structure such that the printhead ICs are aligned with each other and the longitudinal extent of the longitudinally extending channels.

11. A printhead cartridge according to clause 10 wherein the elongate structure has a series of fine conduits extending from each of the longitudinally extending channels to the printhead ICs.

12. A printhead cartridge according to clause 11 wherein the second fluid coupling is structurally a mirror image of the first fluid coupling. 13. A printhead cartridge according to clause 11 wherein the first fluid coupling is positioned at one end of the elongate structure and the second fluid coupling is positioned at the opposite end of the elongate structure such that the spouts of the first and second fluid couplings are in fluid communication with the respective ends of the corresponding longitudinally extending channels.

Claims

1. An inkjet printer comprising:

a printhead cartridge having a pagewidth printhead defining an array of nozzles for ejecting ink onto a media substrate, the printhead cartridge having a fluid coupling in fluid communication with the array of nozzles;
a cradle for supporting the printhead cartridge such that the array of nozzles is adjacent a media feed path extending through the printer, the cradle having a latch mechanism for retaining the printhead cartridge;
an ink reservoir for containing supply of ink; and,
a complementary coupling for fluid communication with the ink reservoir; wherein,
the fluid coupling and the complementary coupling are configured to establish a sealed fluid connection using mechanical advantage provided by user actuation of the latch mechanism to retain the printhead cartridge in the cradle.

2. An inkjet printer according to claim 1 wherein the complementary coupling is movable between a disengaged position that is retracted clear of the fluid coupling, and an engaged position in contact with the fluid coupling.

3. An inkjet printer according to claim 2 wherein the fluid coupling has at least one first conduit and the complementary coupling has at least one second conduit, the second conduit having a seal seat and a compression member that is movable relative to the seal seat, and an annular seal positioned in the seal seat such that user actuation of the latch mechanism to retain the printhead cartridge in the cradle, forces the compression member to compress the annular seal against the seal seat to create a fluid seal with the first conduit.

4. An inkjet printer according to claim 3 wherein the second conduit telescopically engages first conduit when the complementary coupling is moved from the disengaged position to the engaged position such that engaged position the annular seal is compressed to create a fluid seal.

5. An inkjet printer according to claim 4 wherein the mechanical advantage provided by user actuation

of the latch mechanism, is leverage generated by a lever system linking the latch mechanism and the compression member.

6. An inkjet printer according to claim 4 wherein the lever system completely disengages the second conduit from the first conduit when it moves the second conduit to the disengaged position.

7. An inkjet printer according to any one of the preceding claims wherein the annular seal is a ring of resilient material.

8. An inkjet printer according to claim 7 wherein the ring of resilient material has a radial cross sectional shape with at least one straight side when the pressed, and said at least one straight side bulging to a curved shape when compressed.

9. An inkjet printer according to any one of the preceding claims wherein the fluid coupling has a plurality of first conduits and the corresponding coupling has a corresponding plurality of second conduits, and the lever system actuates to simultaneously engage and disengage the plurality of first and second conduits.

10. An inkjet printer according to claim 9 wherein the annular seals for each of the second conduits are arranged such that they are all compressed by the compression member simultaneously.

11. An inkjet printer according to claim 10 wherein the second conduits are formed in an arrangement with a geometric centroid at which the lever system connects to the compression member.

12. An inkjet printer according to claim 11 wherein the second conduits are arranged in a circle and the lever system connects to the centre of the circle.

13. An inkjet printer according to claim 12 wherein the fluid coupling has an interface plate supporting the plurality of first conduits, each of the first conduits positioned for sealed engagement with a corresponding plurality of ink tanks containing different types of ink.

14. An inkjet printer according to claim 13 wherein the first conduits are each spouts extending from an interface plate for mounting the spouts in a configuration matching the arrangement of the second conduits.

15. An inkjet printer according to claim 13 wherein the interface plate has surface formations individually associated with each of the spouts respectively, the surface formations defining preferred flow path along the interface plate for any residual ink draining away from the spouts under gravity, the preferred flow paths being configured to avoid any other spouts.

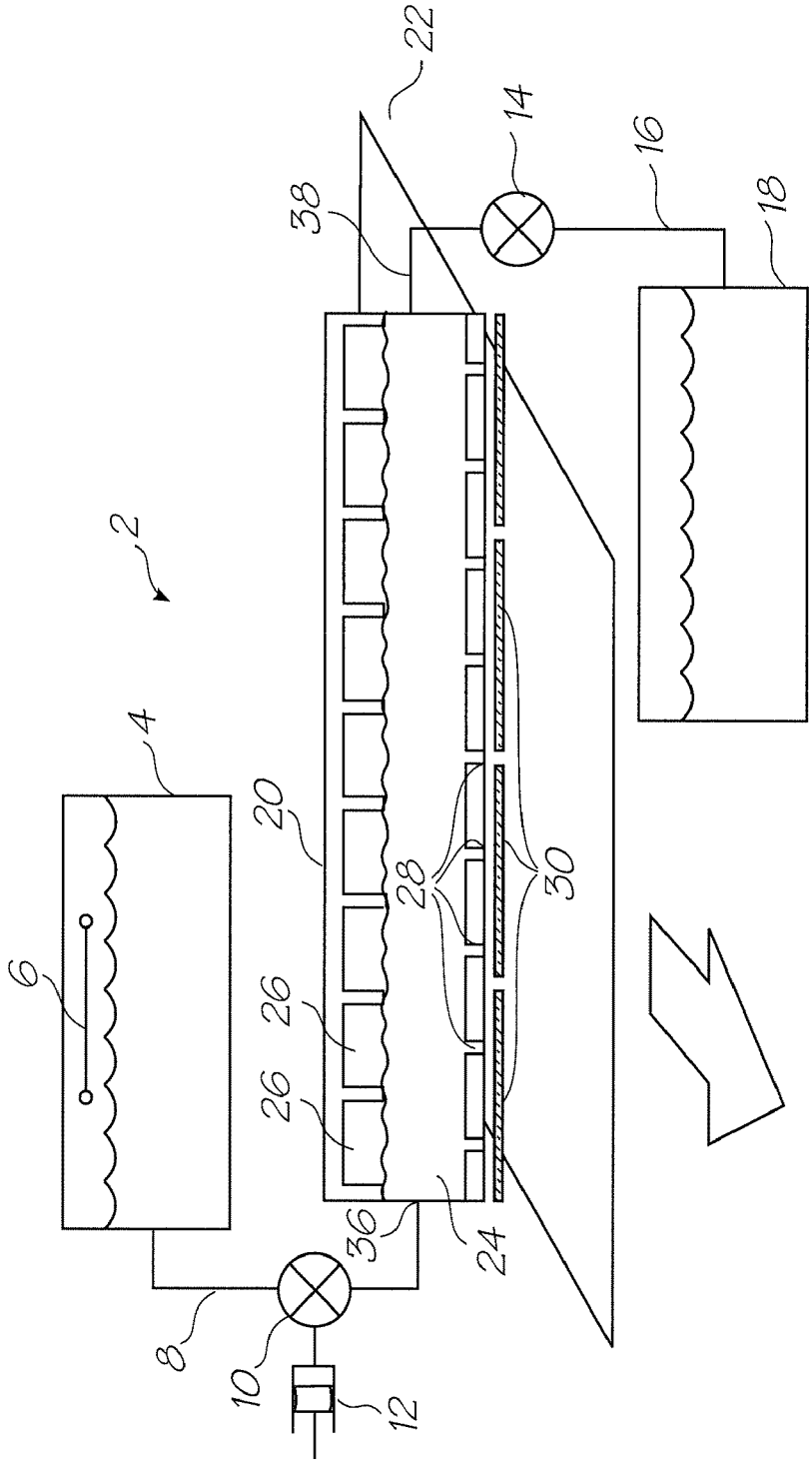

FIG. 1

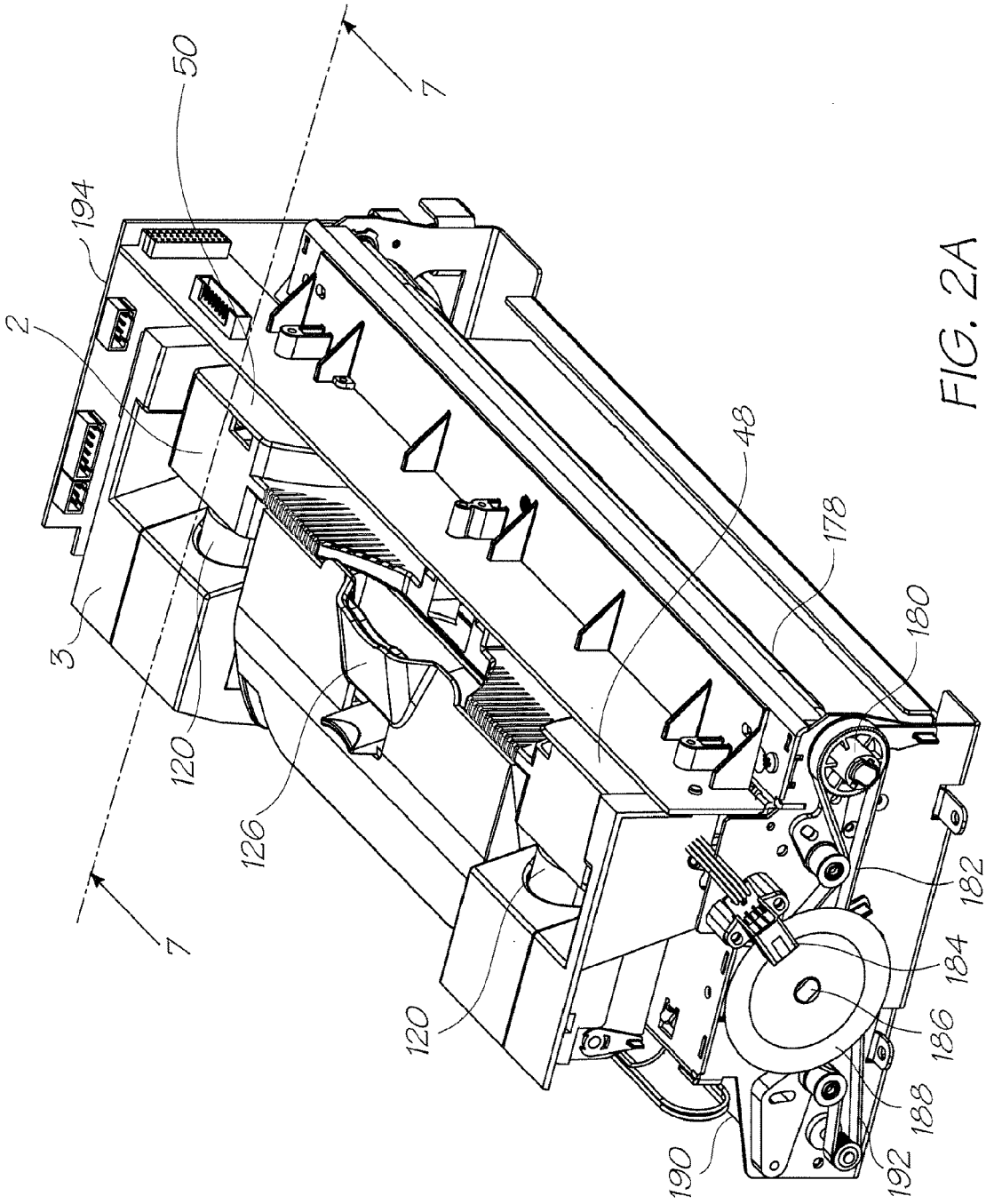

FIG. 2A

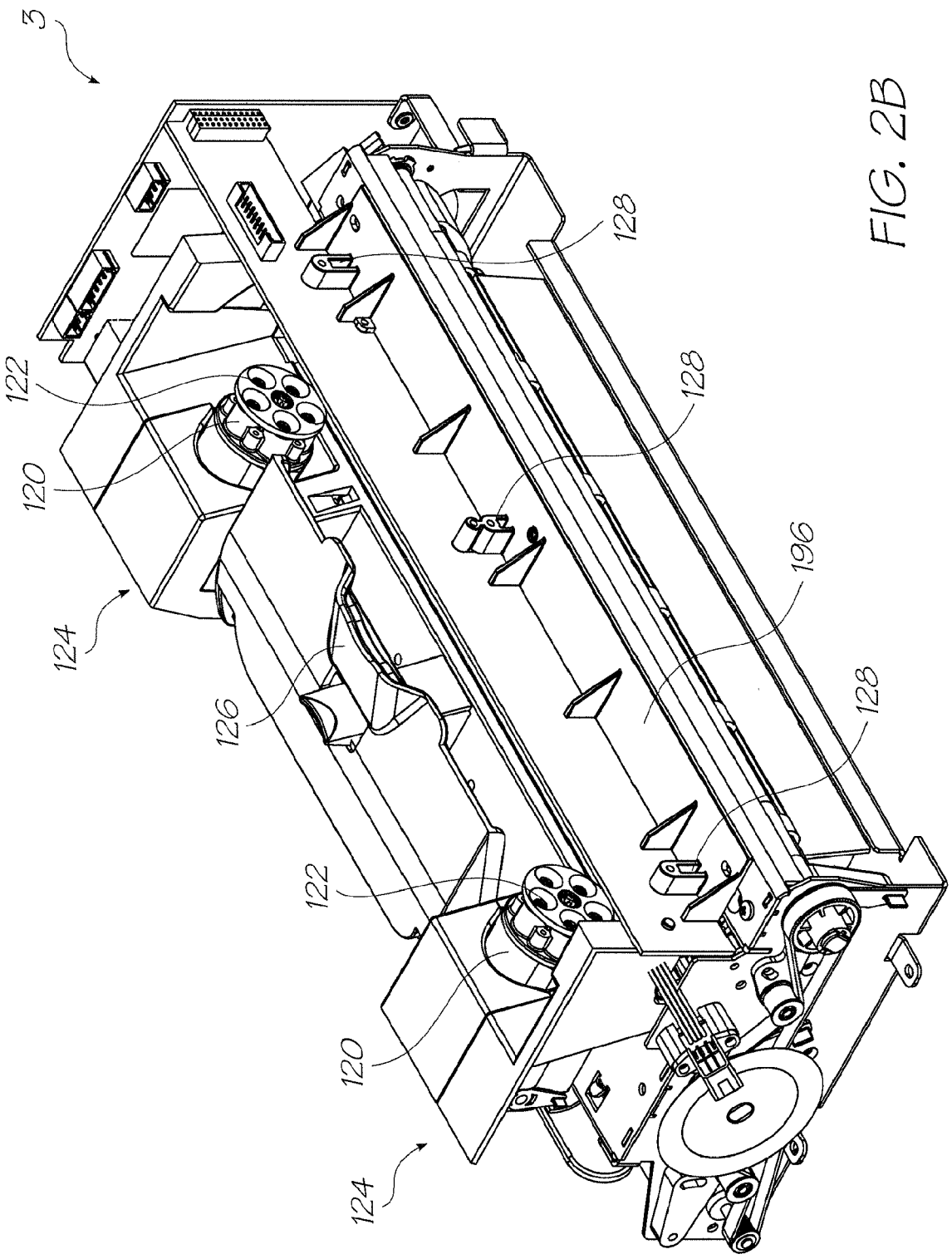

FIG. 2B

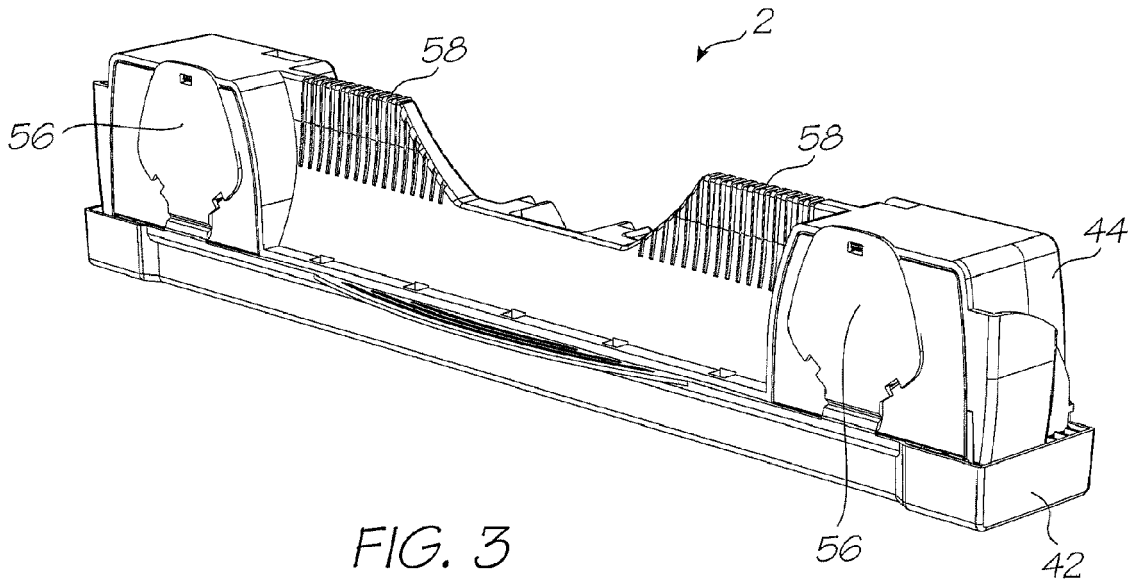

FIG. 3

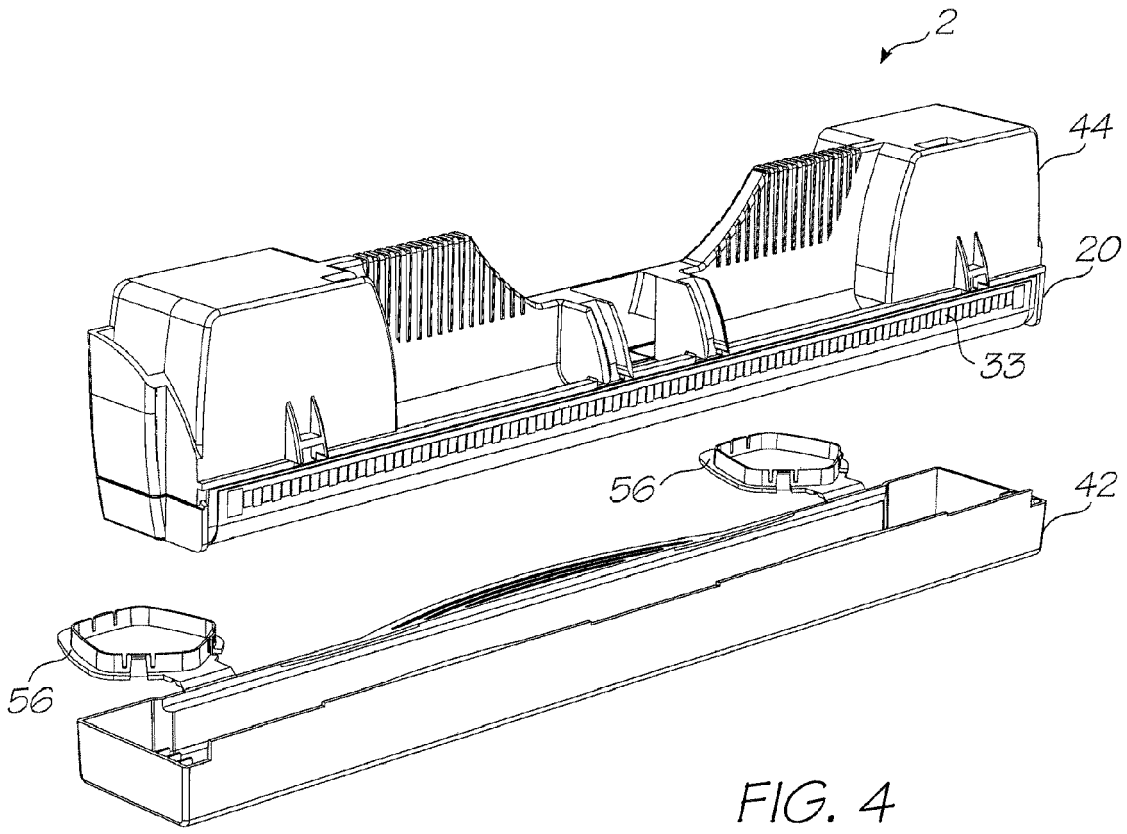

FIG. 4

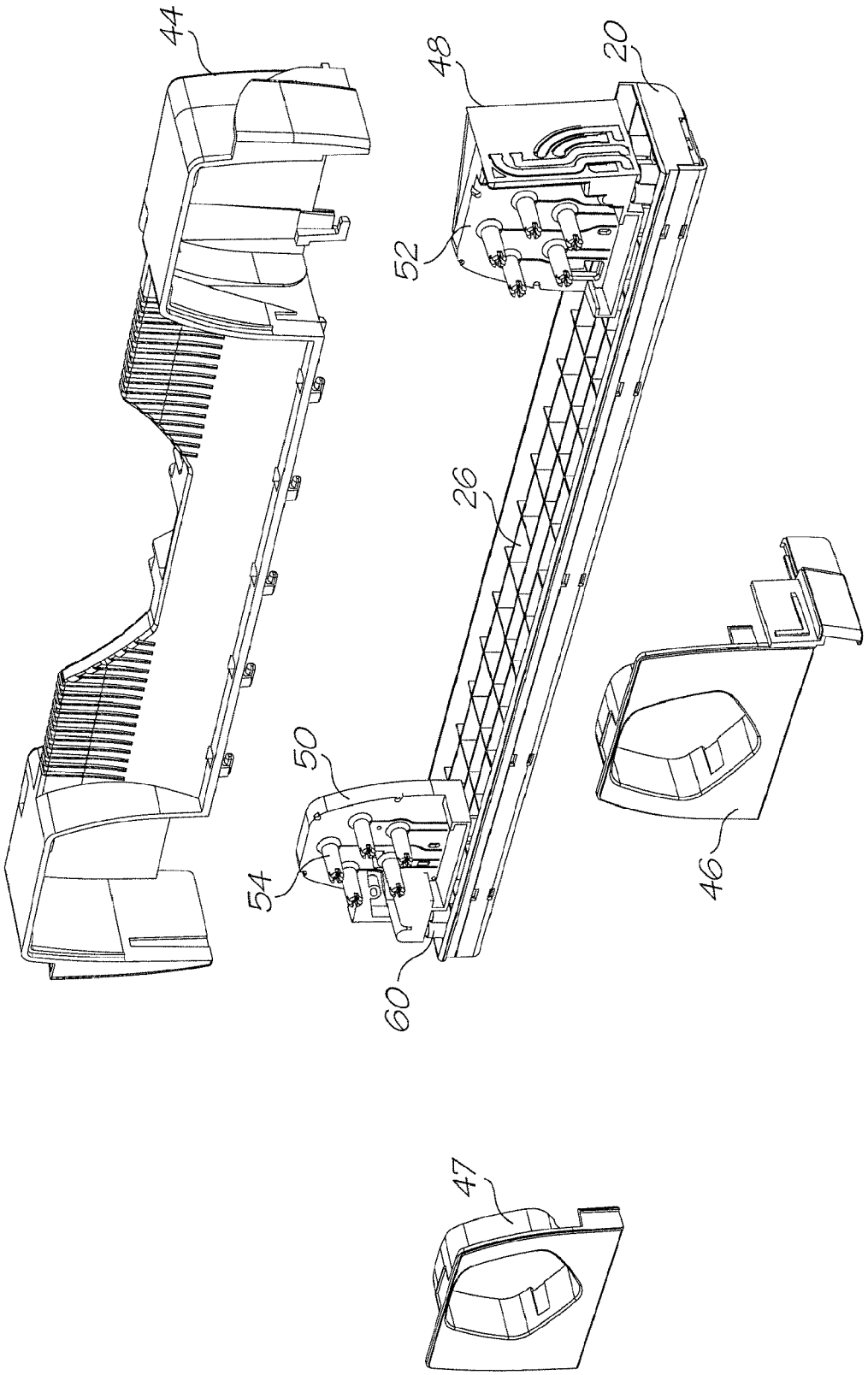

FIG. 5

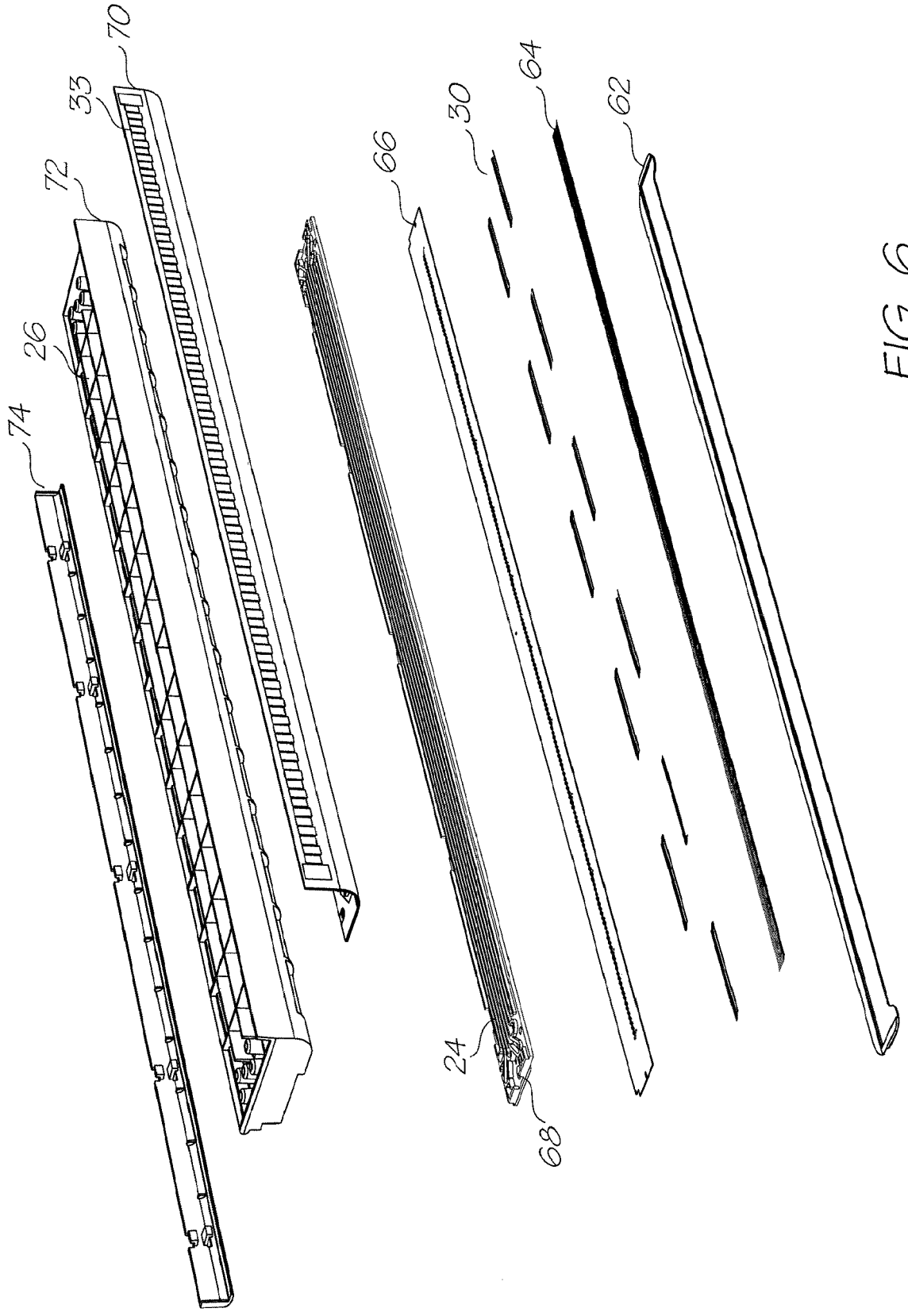

FIG. 6

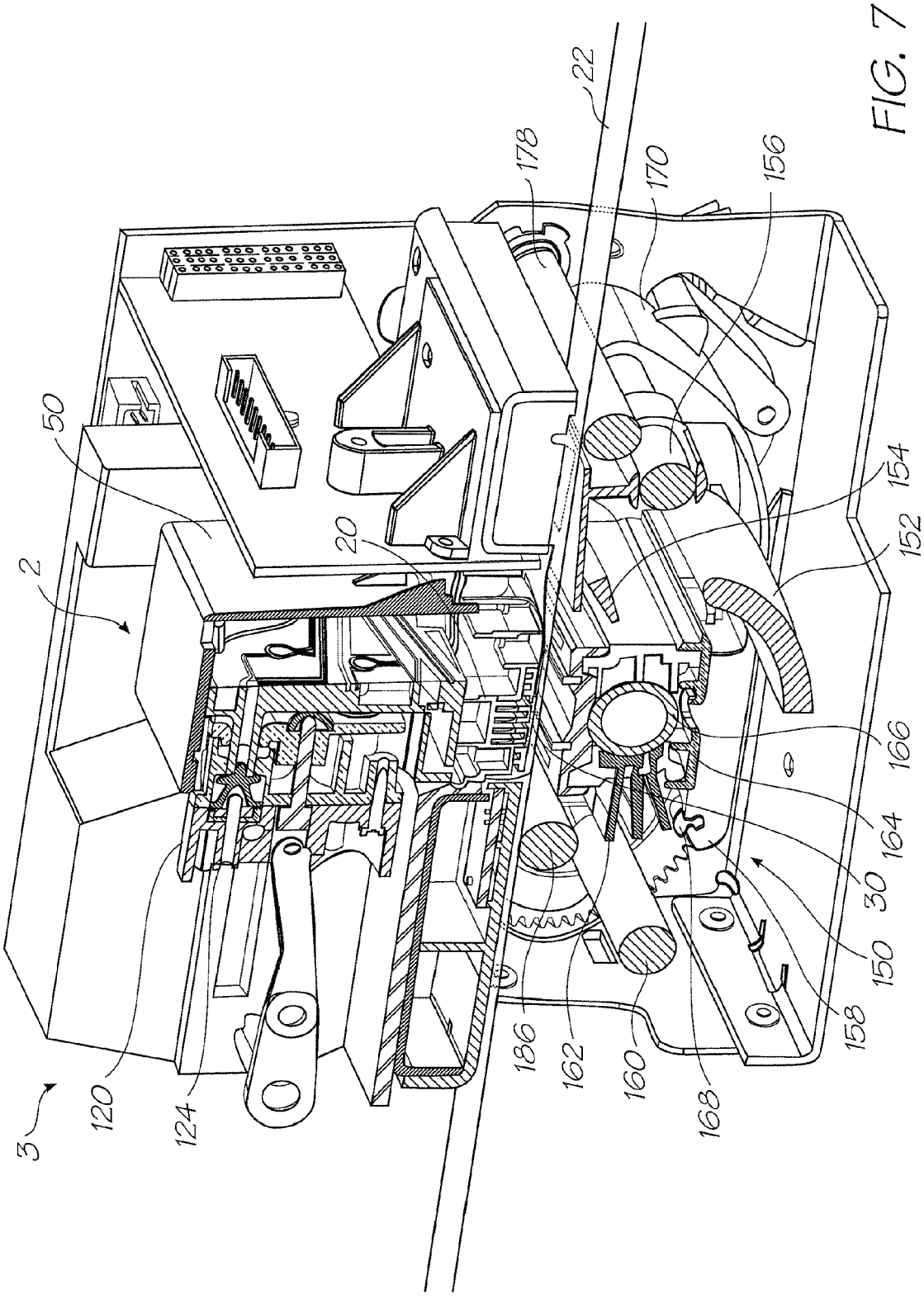
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FIG. 7

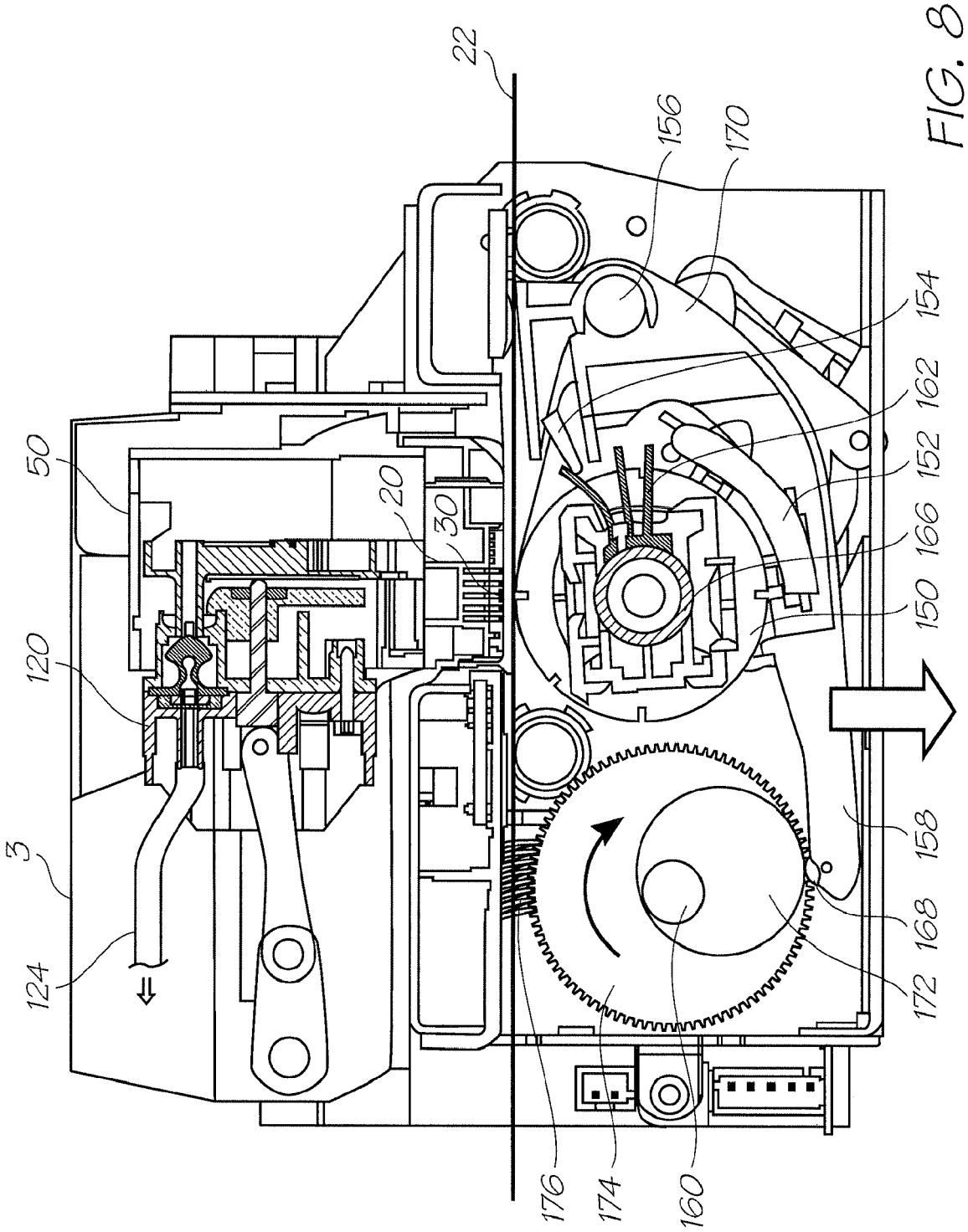
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FIG. 8

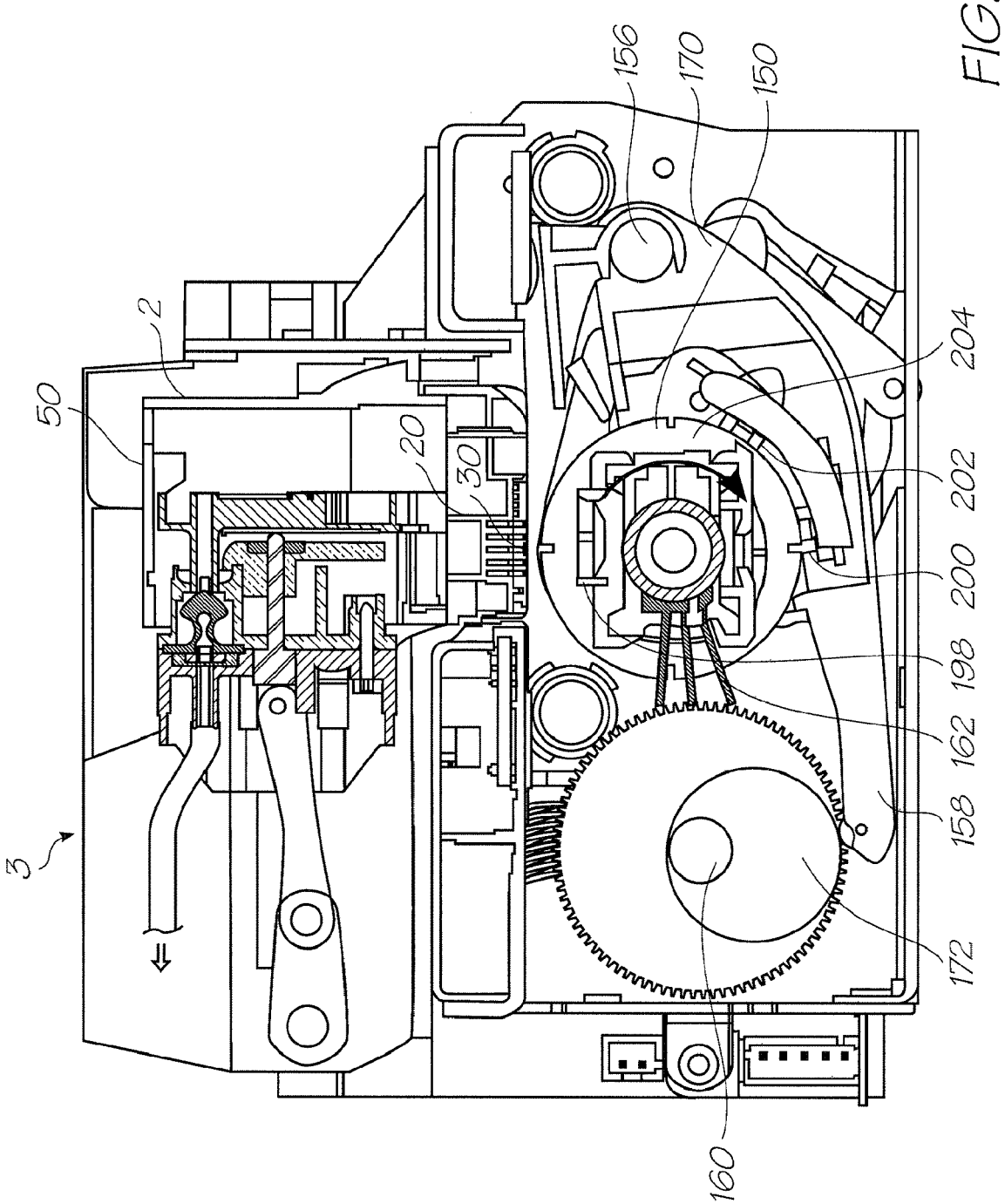

FIG. 9

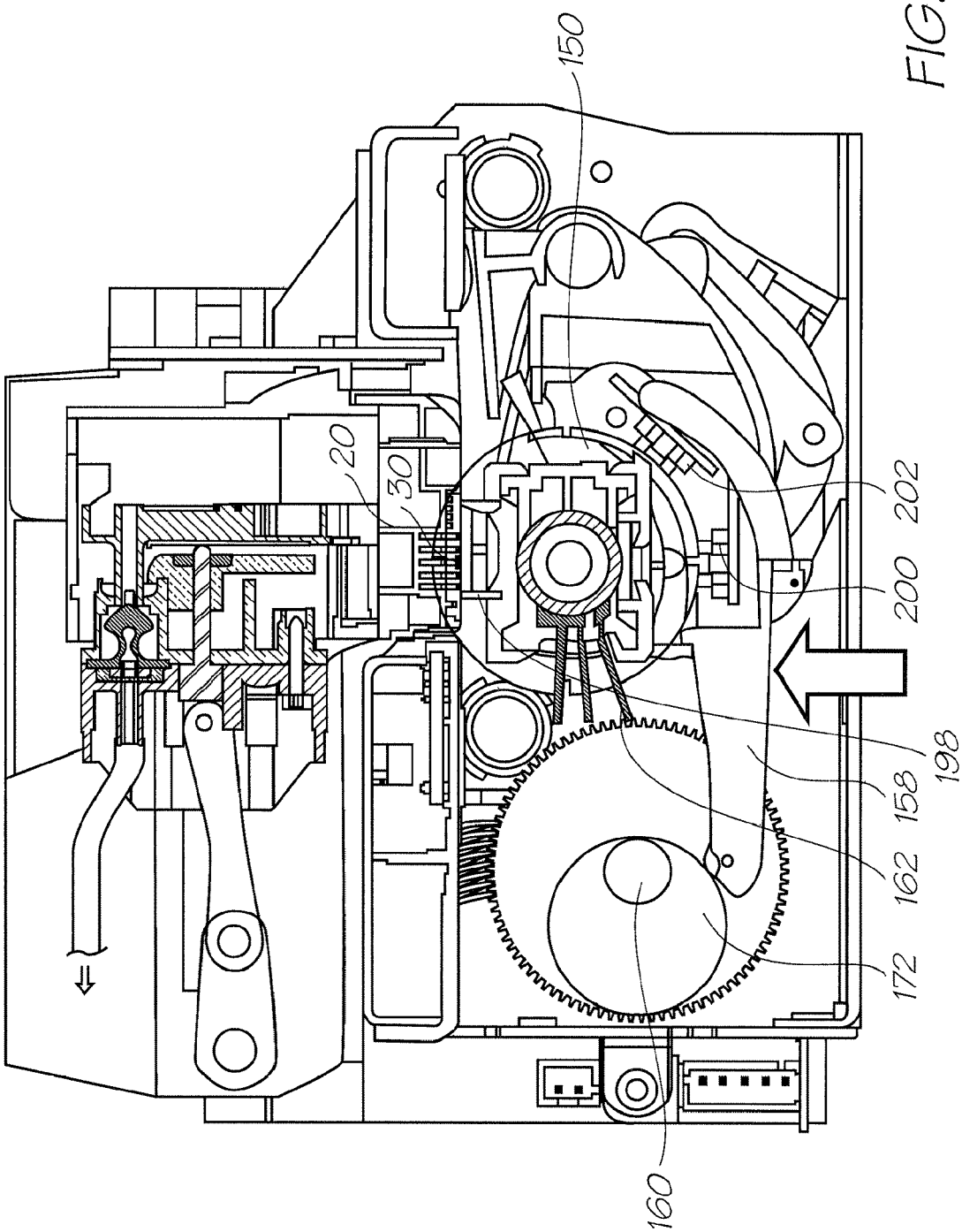

FIG. 10

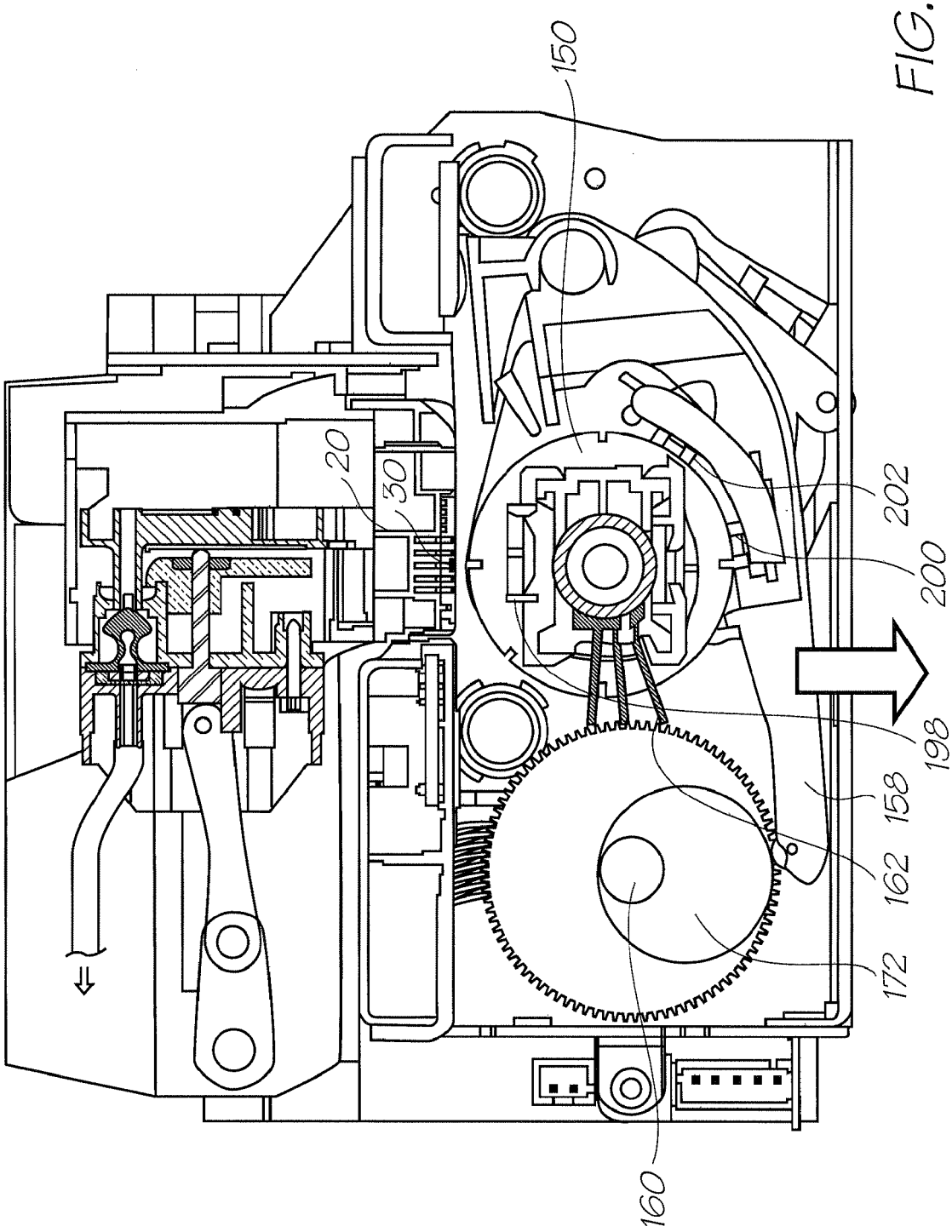

FIG. 11

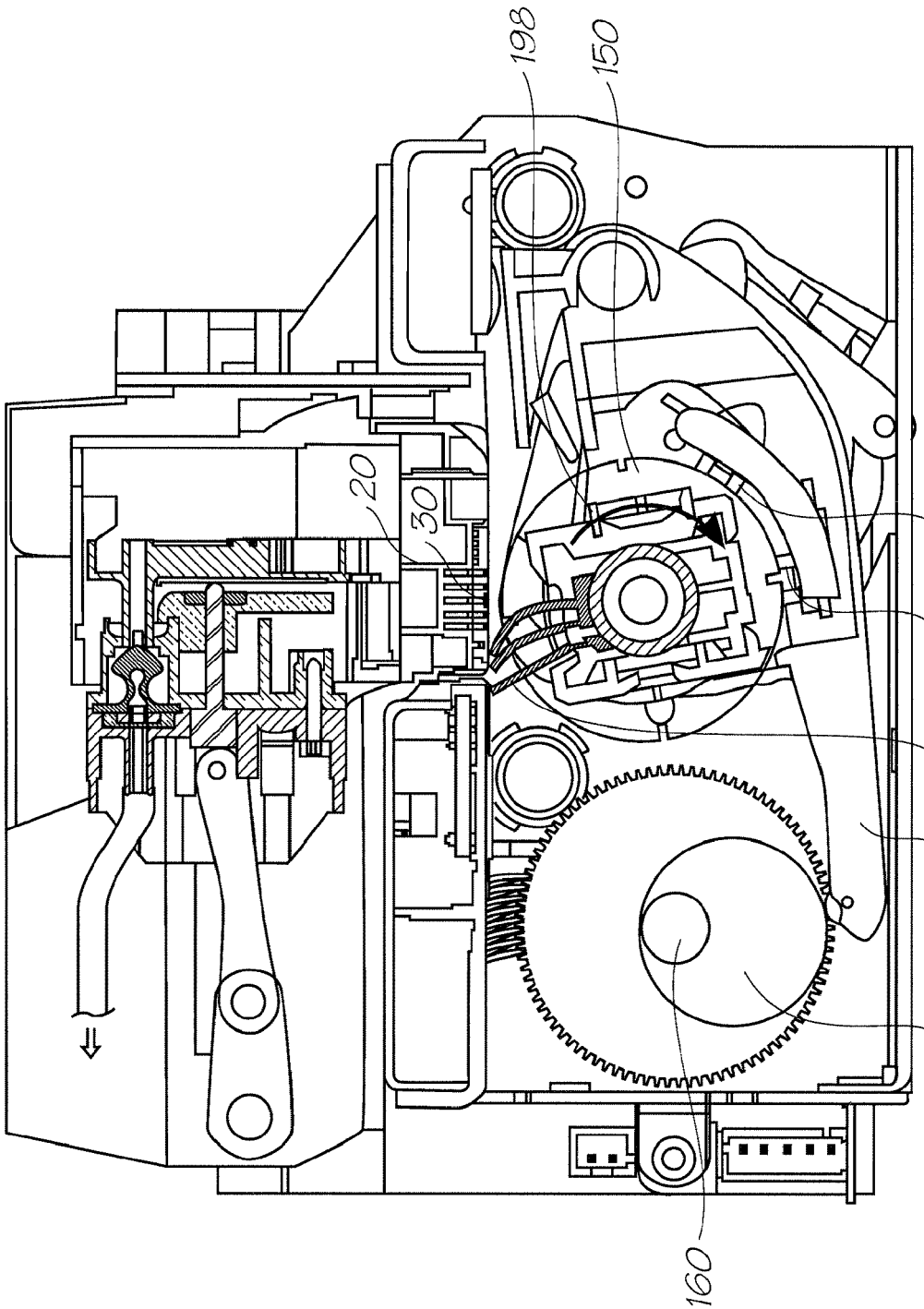

FIG. 12

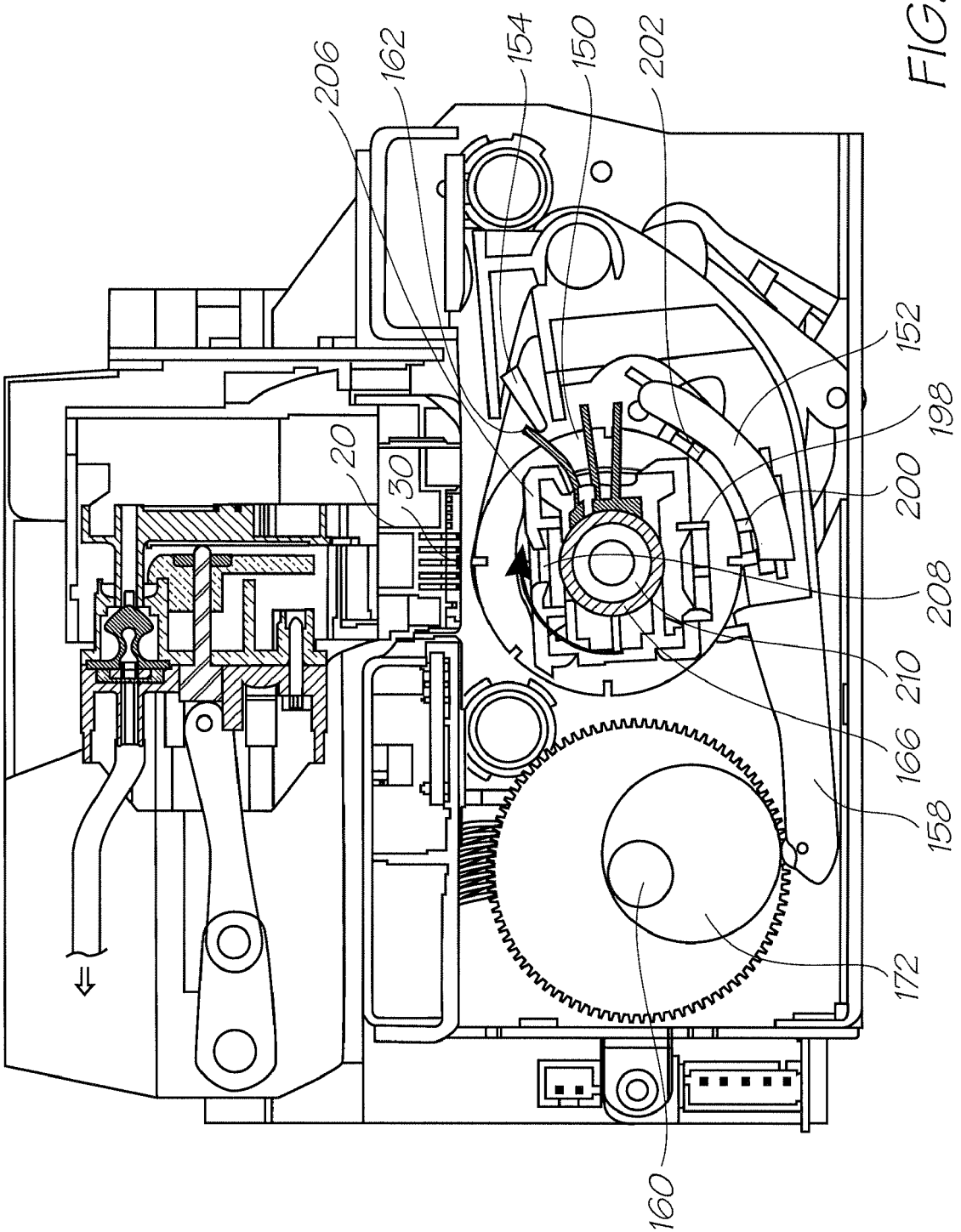

FIG. 13

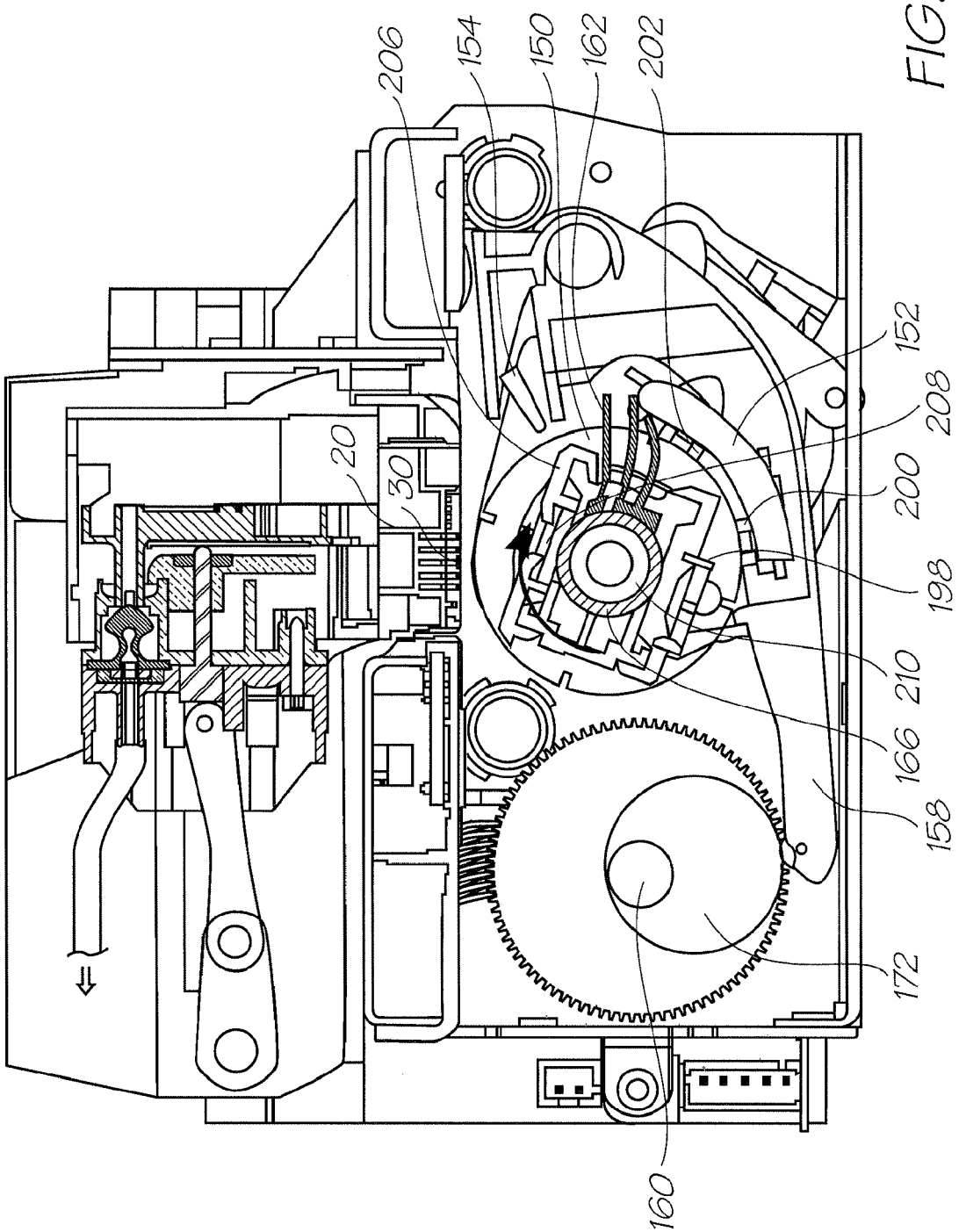

FIG. 14

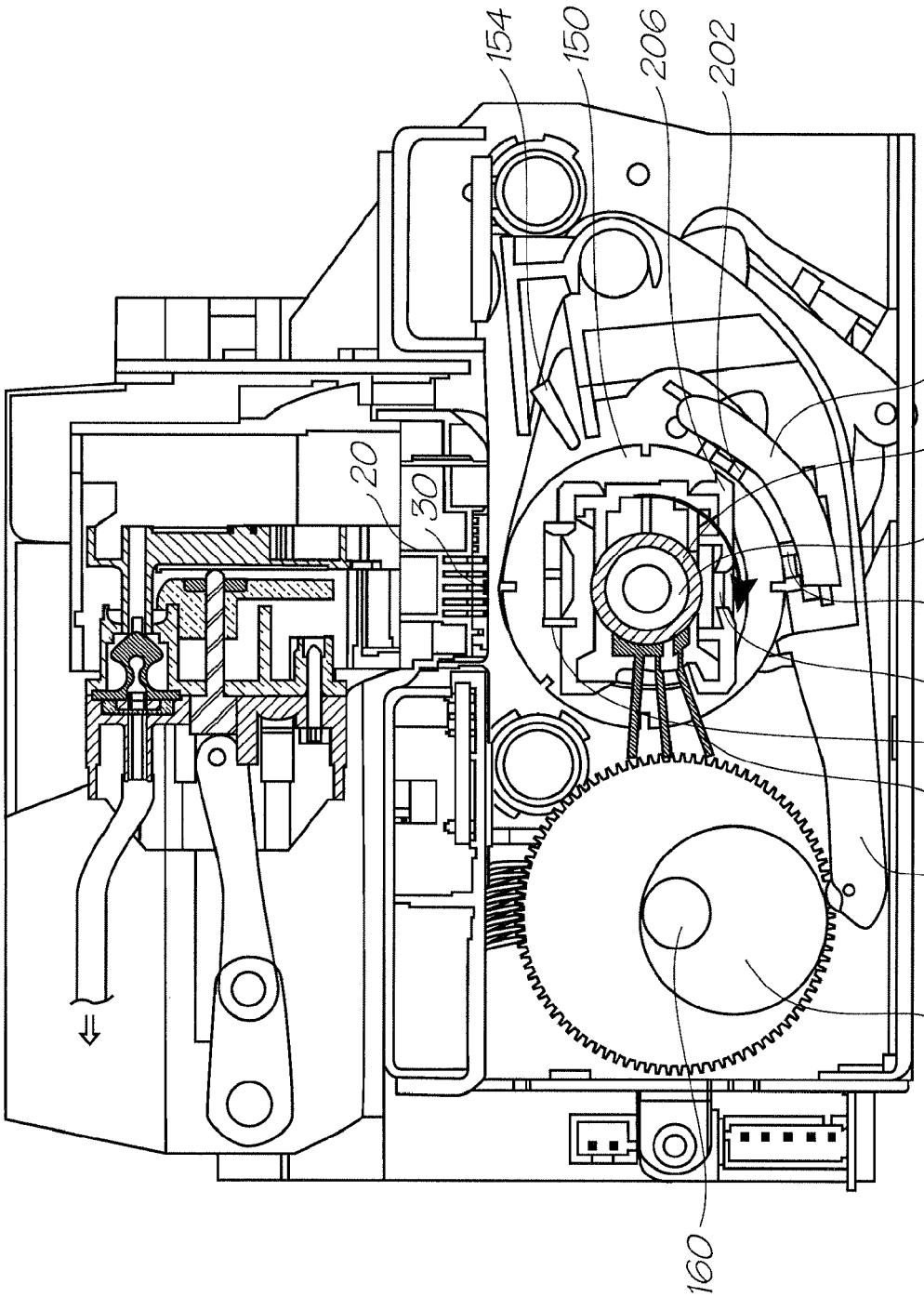

FIG. 15

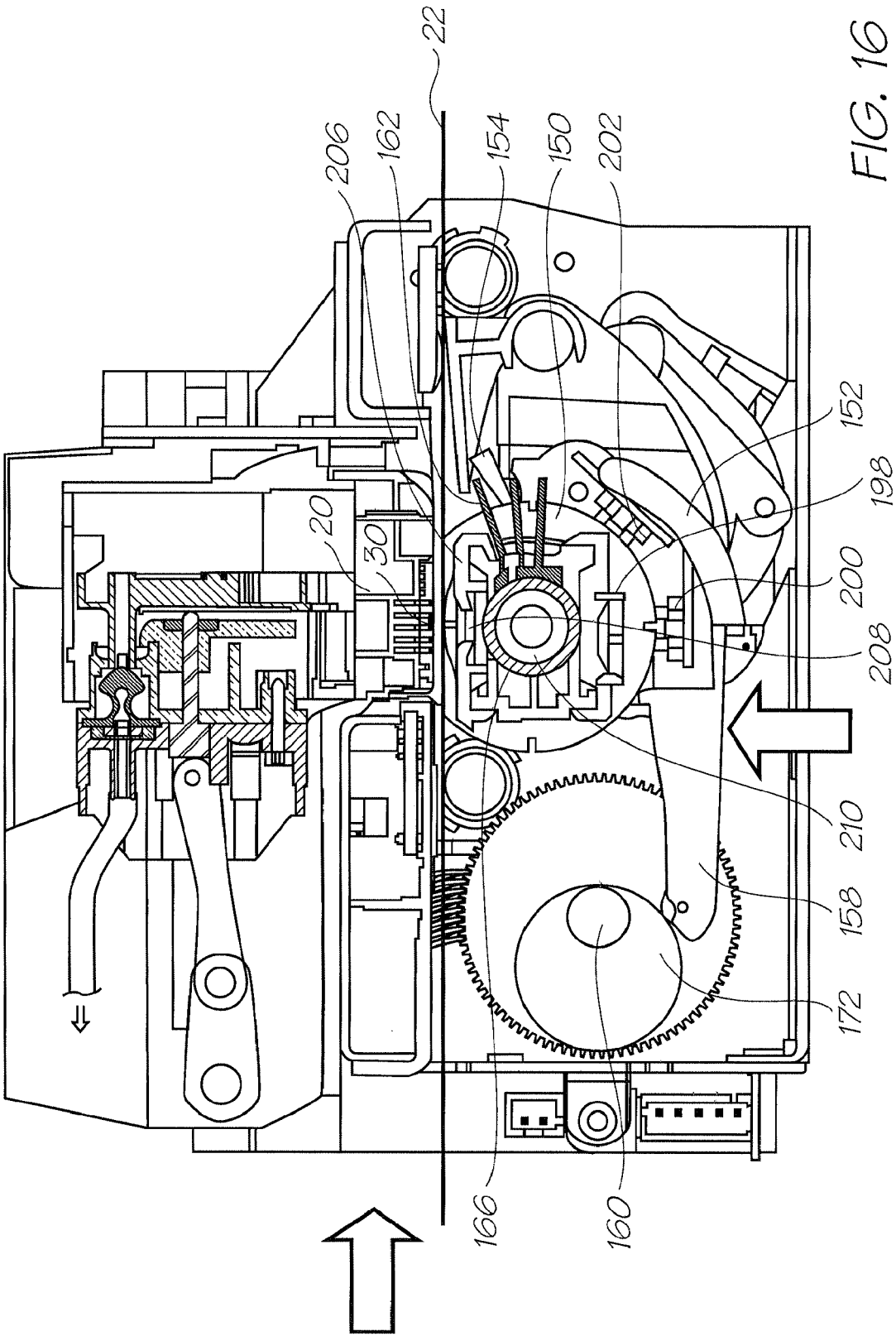

FIG. 16

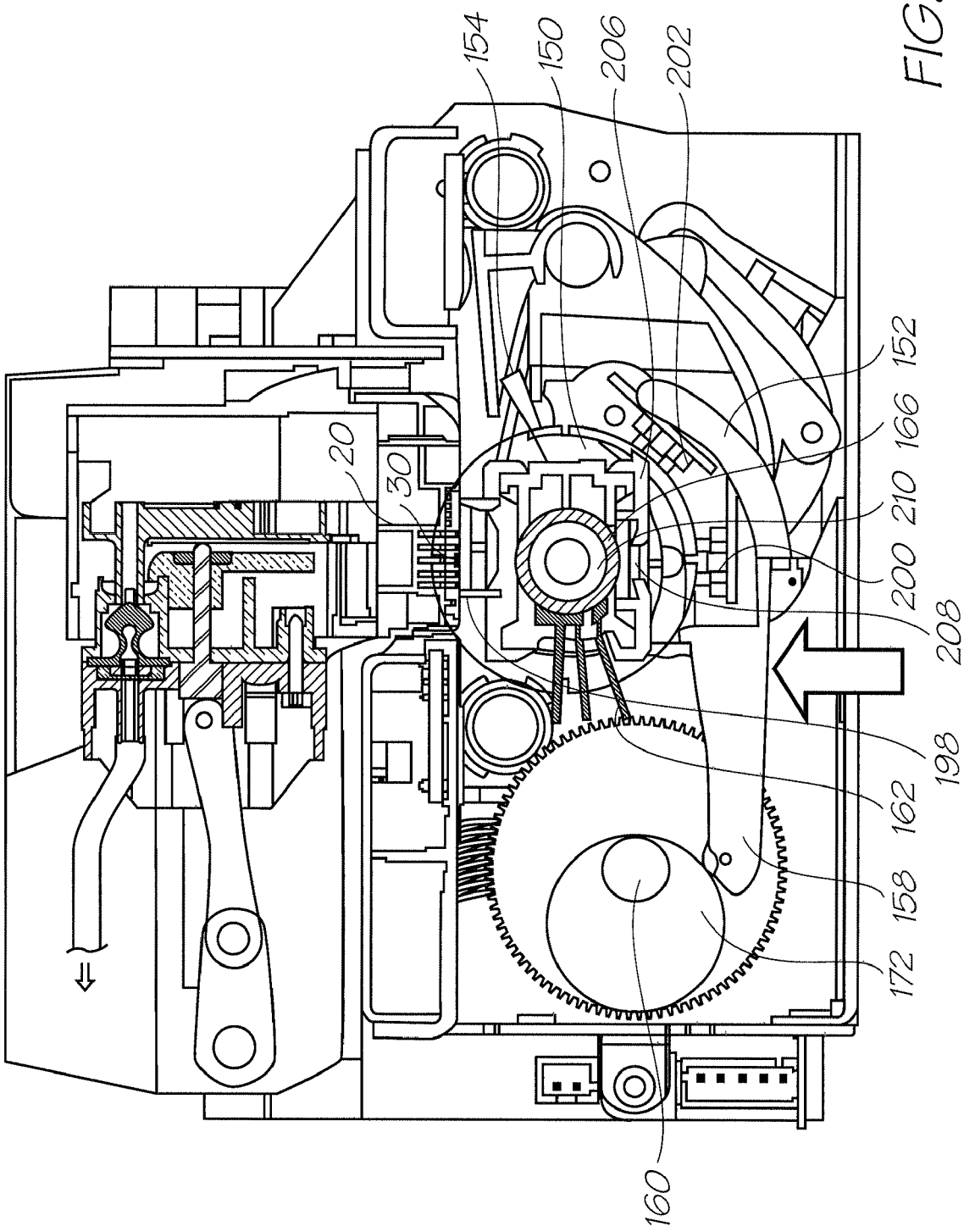

FIG. 17

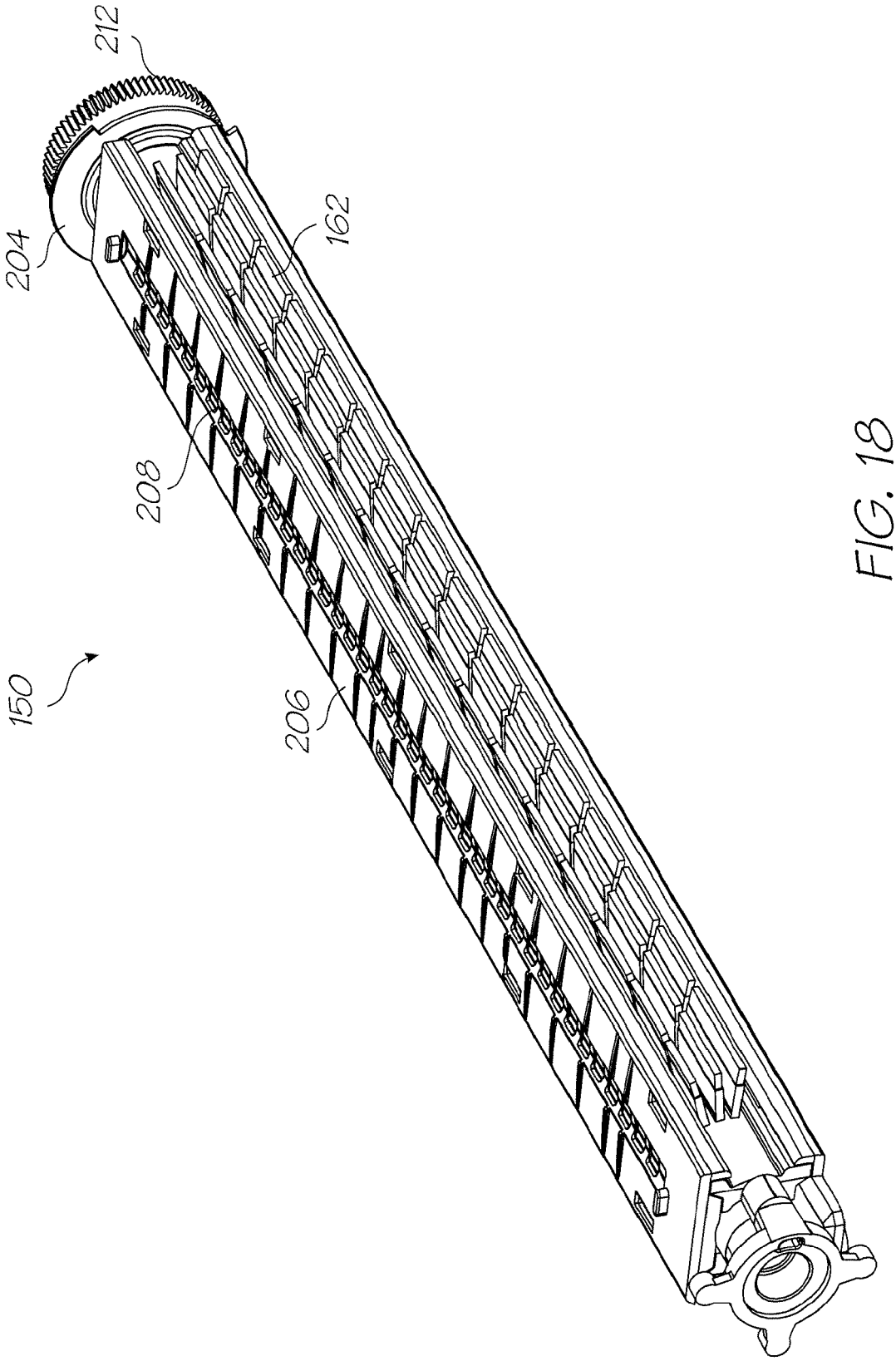

FIG. 18

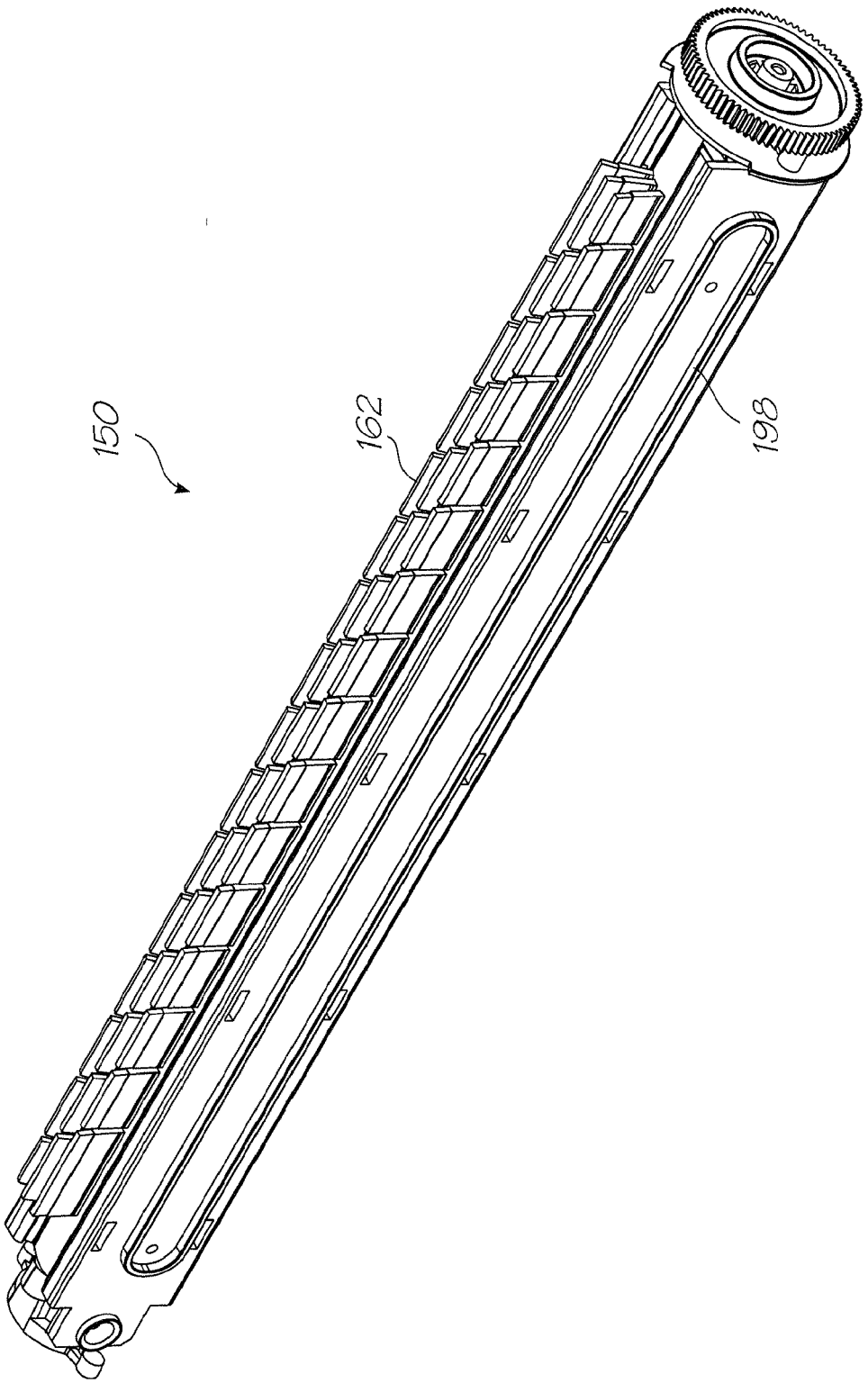

FIG. 19

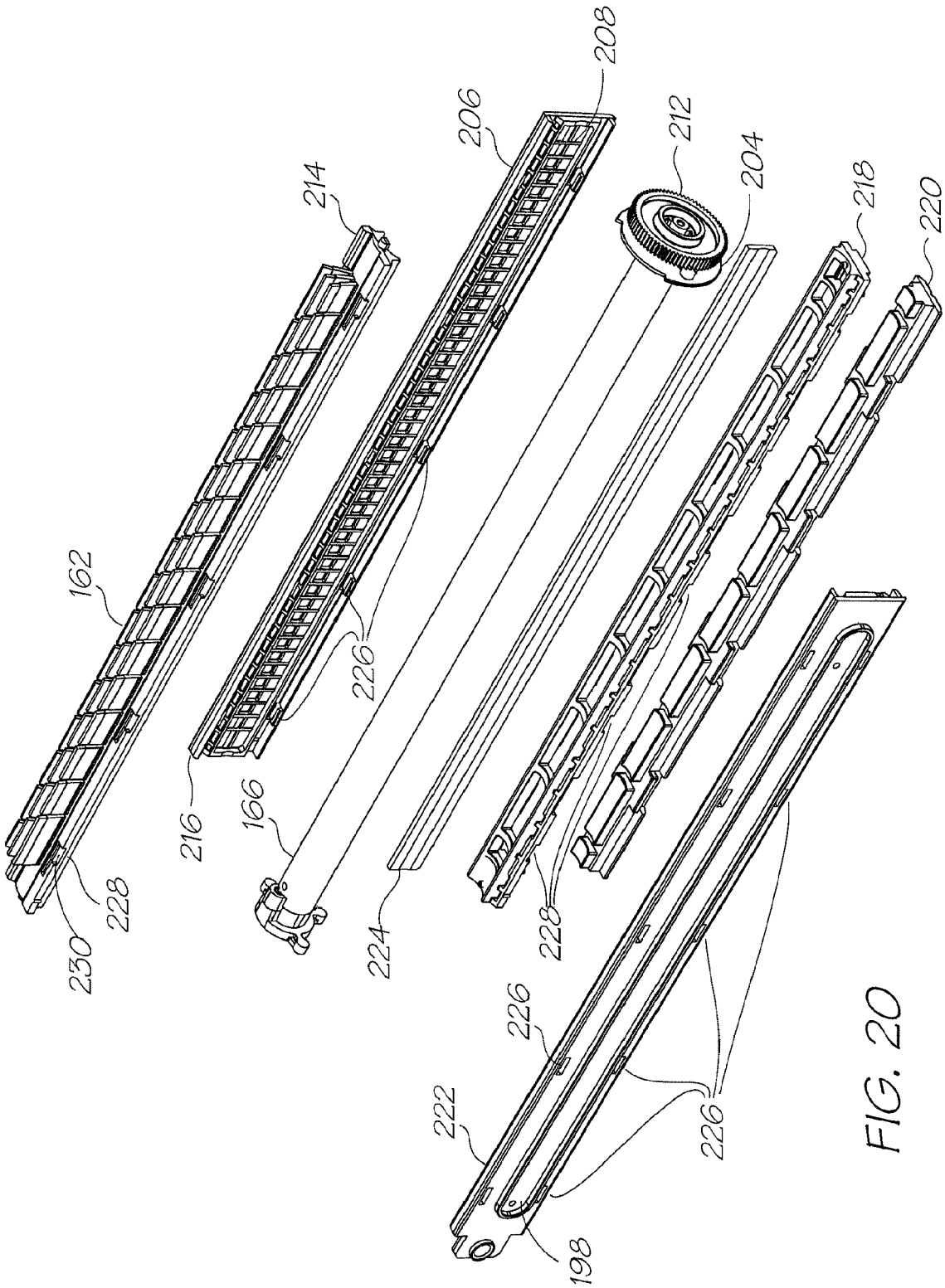
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FIG. 20

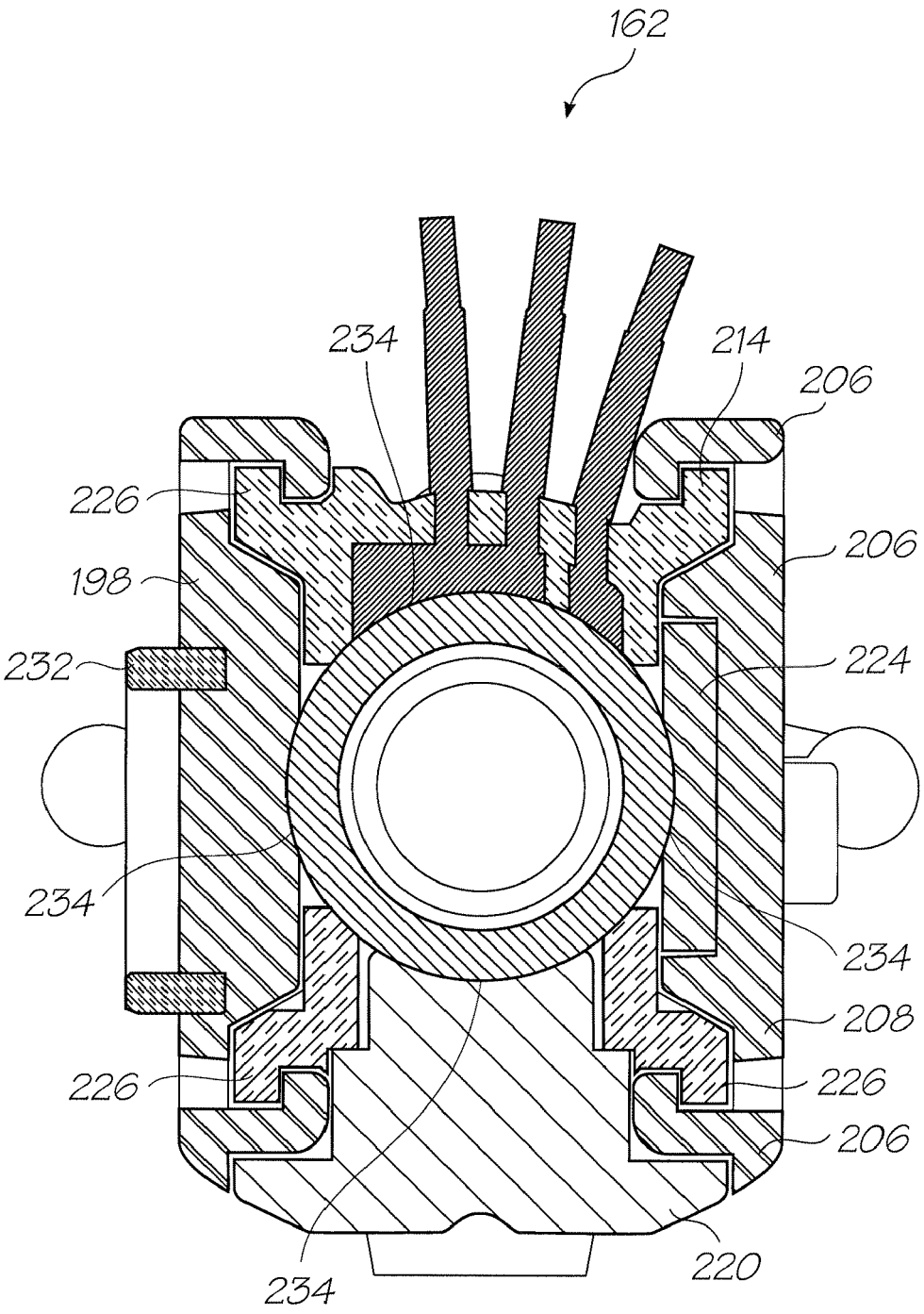
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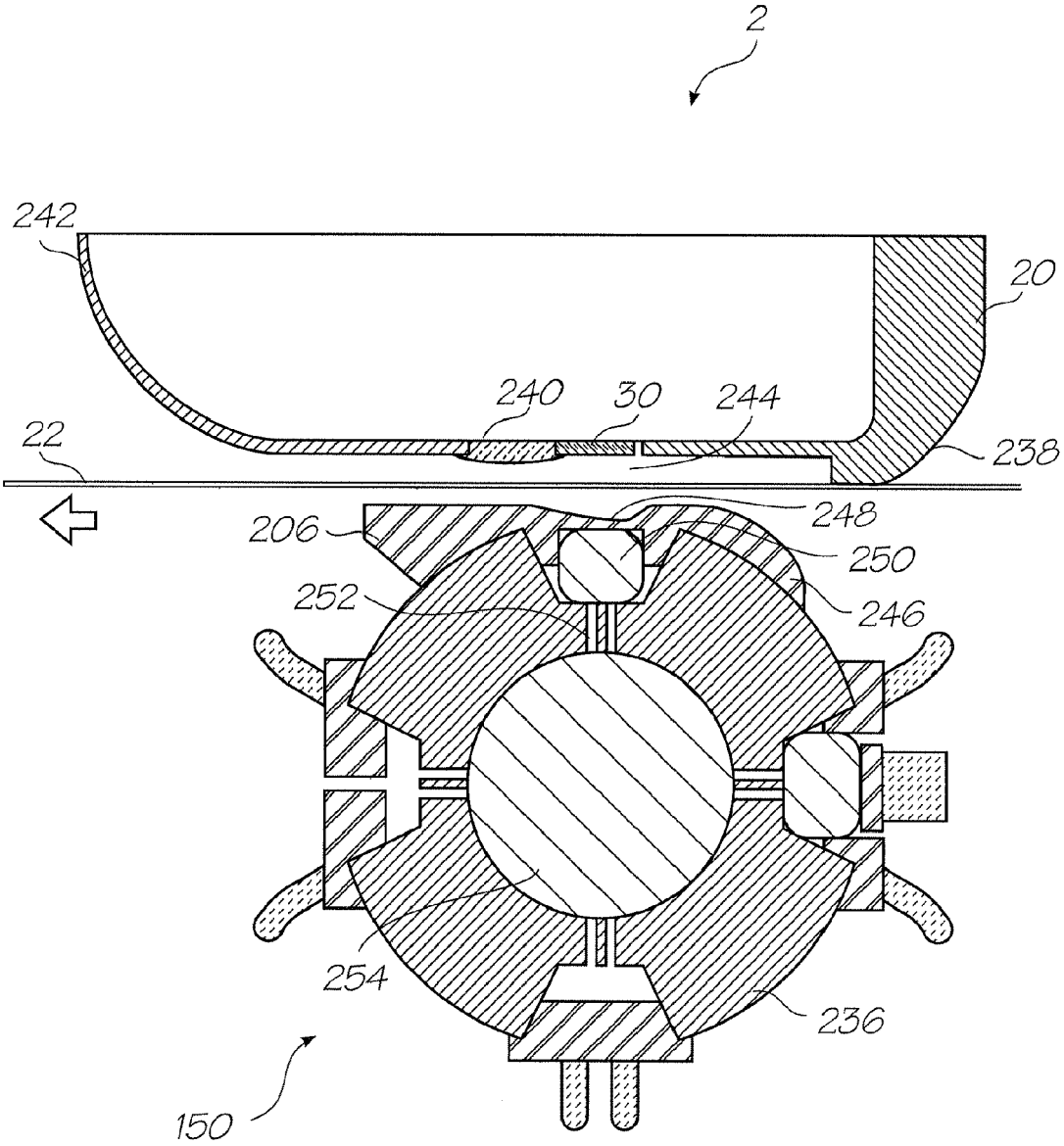
FIG. 21



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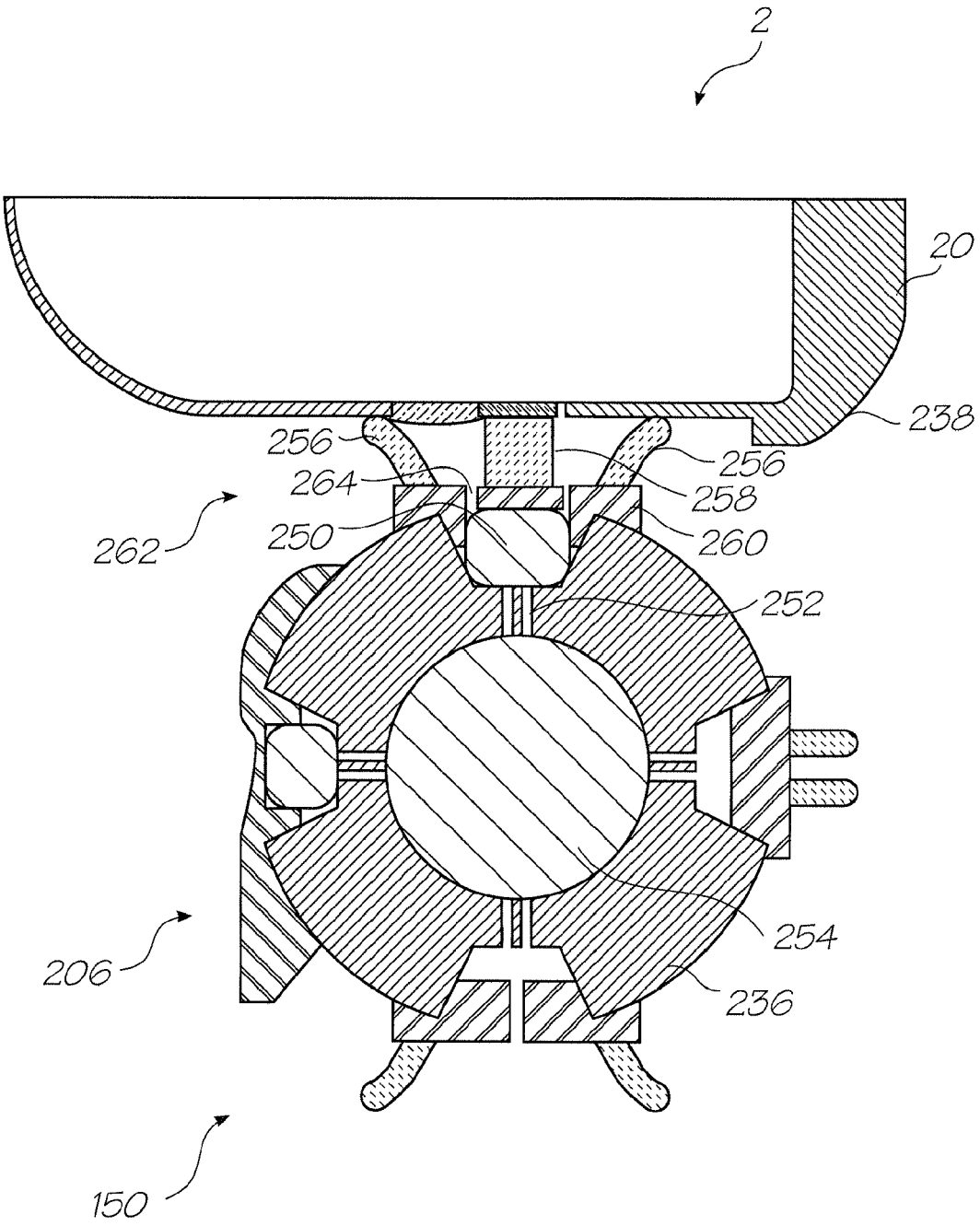

FIG. 23

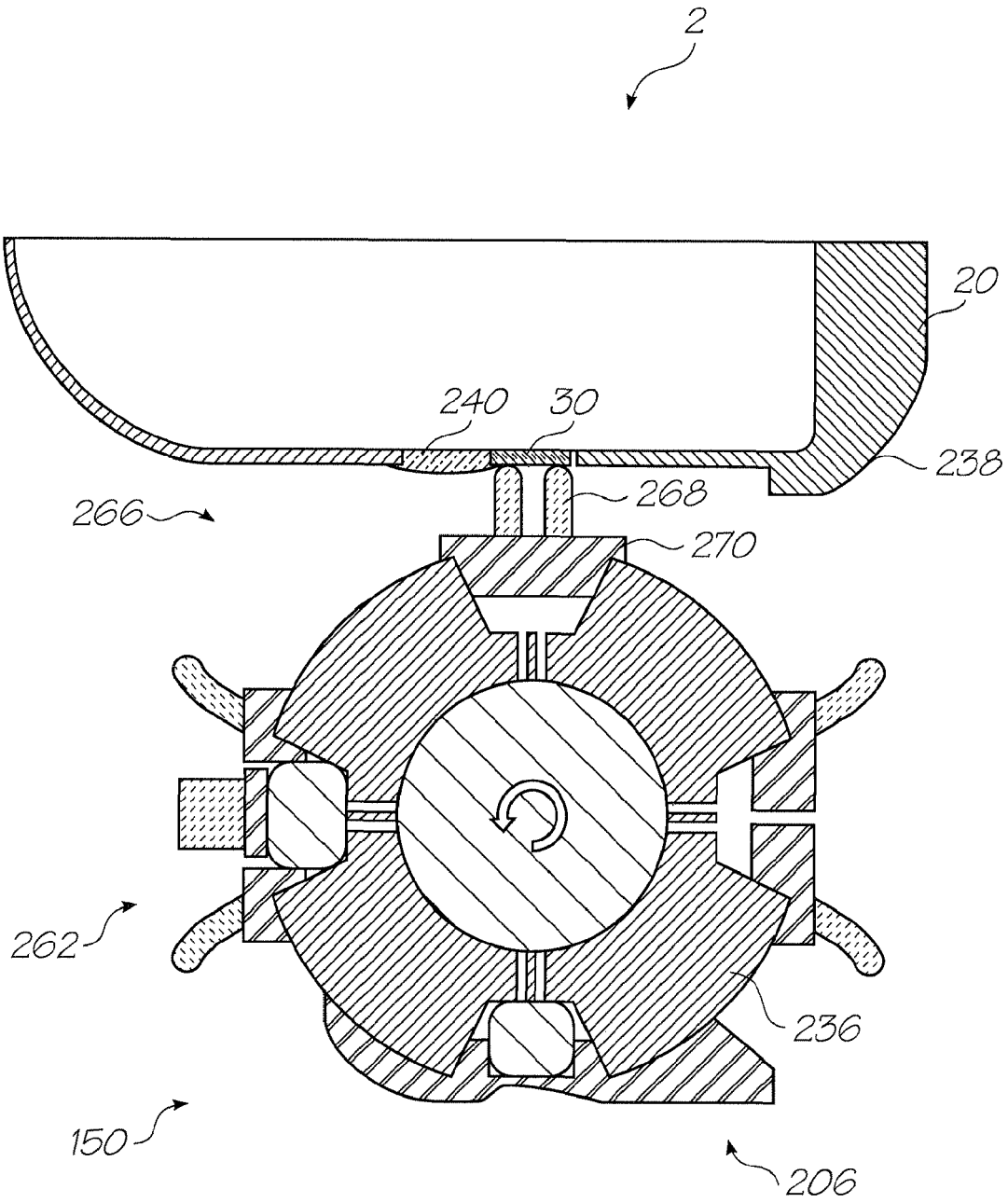

FIG. 24

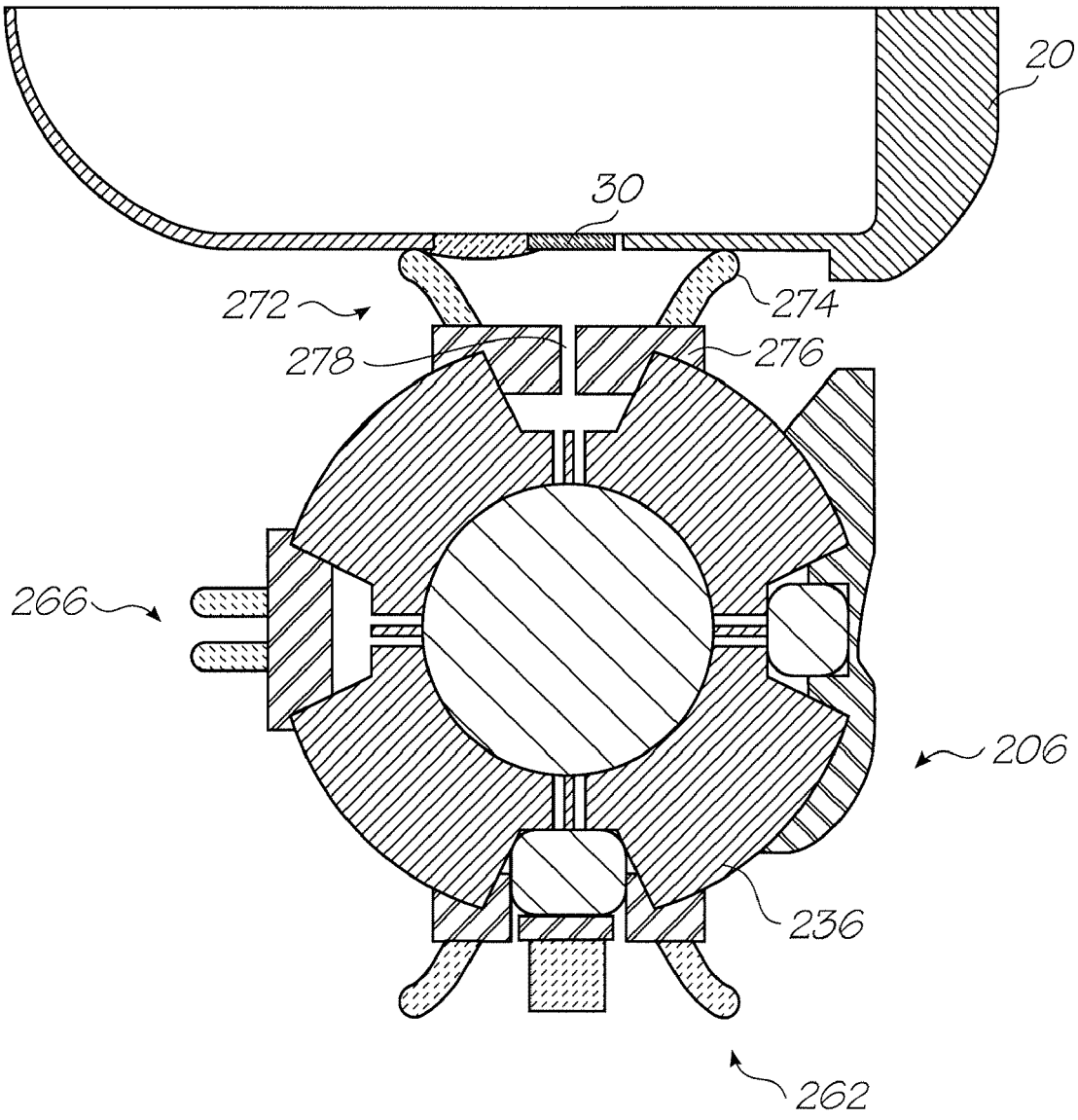

FIG. 25

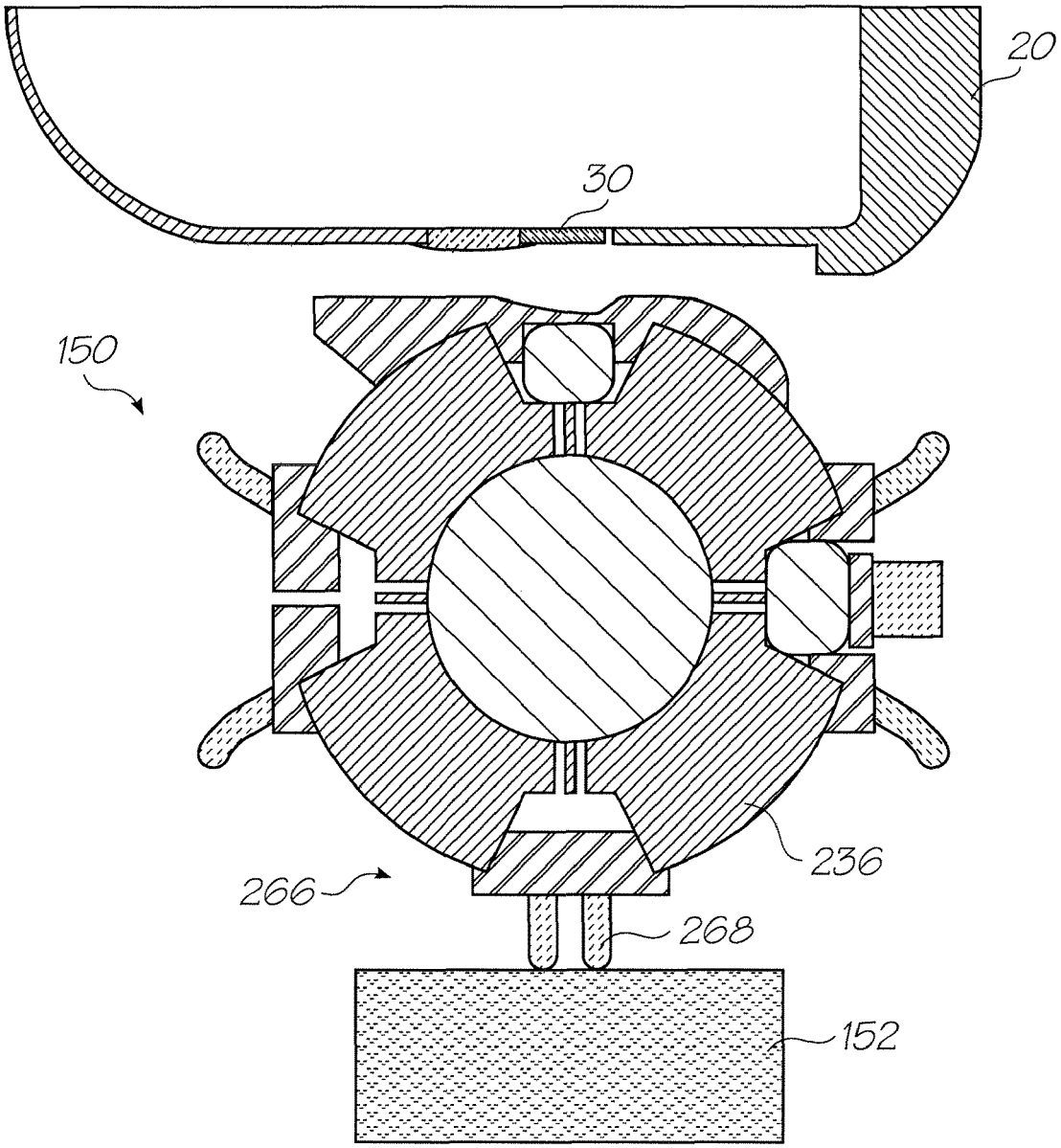

FIG. 26

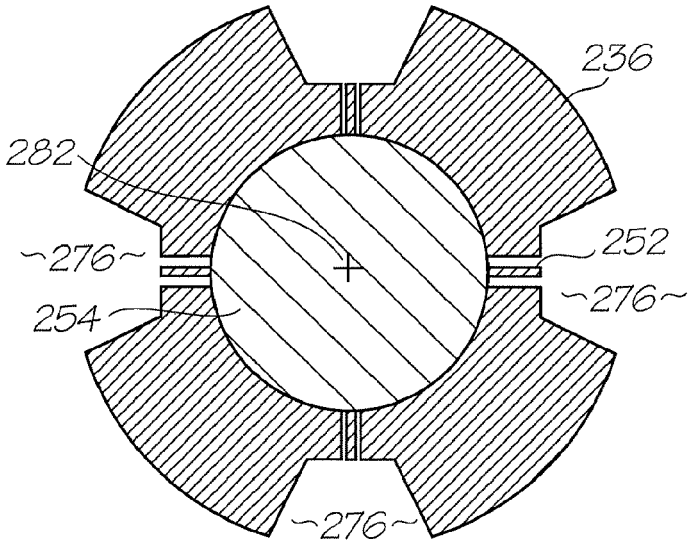

FIG. 27

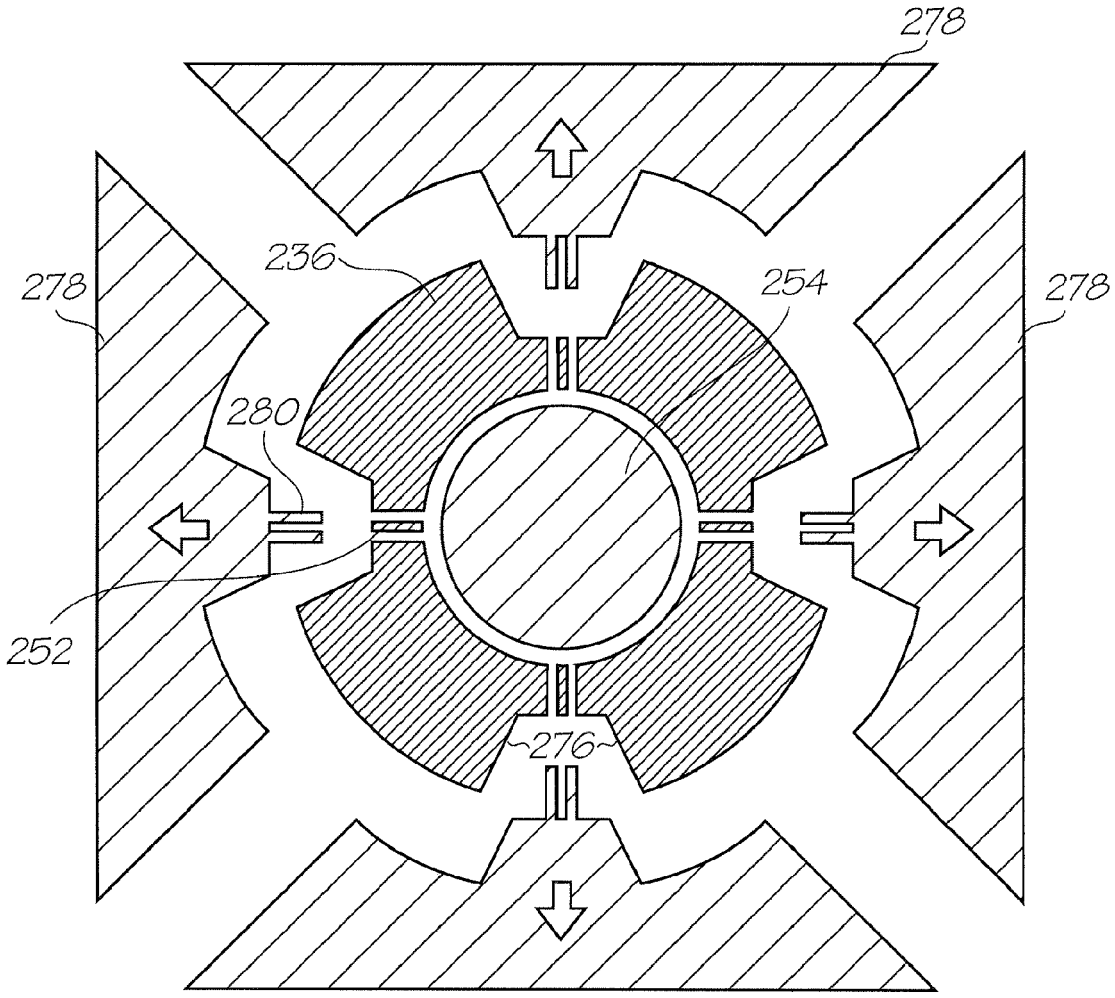

FIG. 28

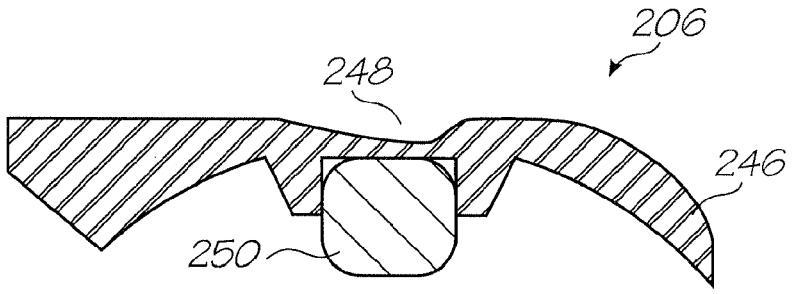

FIG. 29

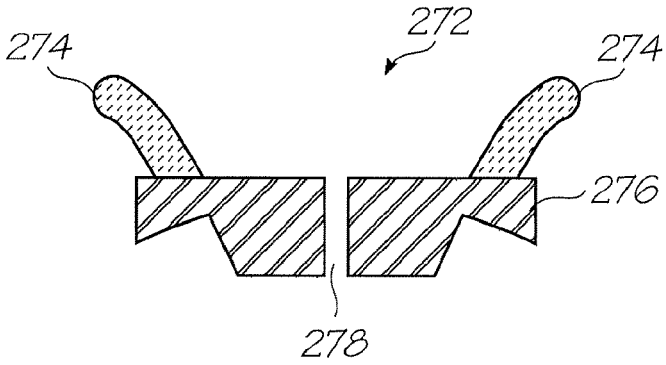

FIG. 30

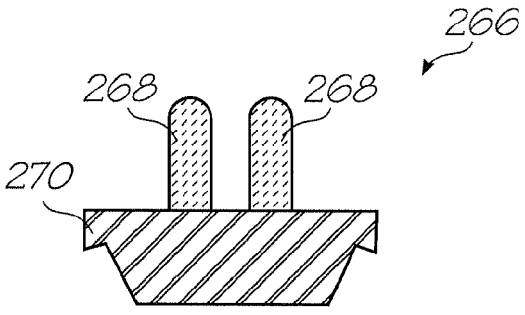

FIG. 31

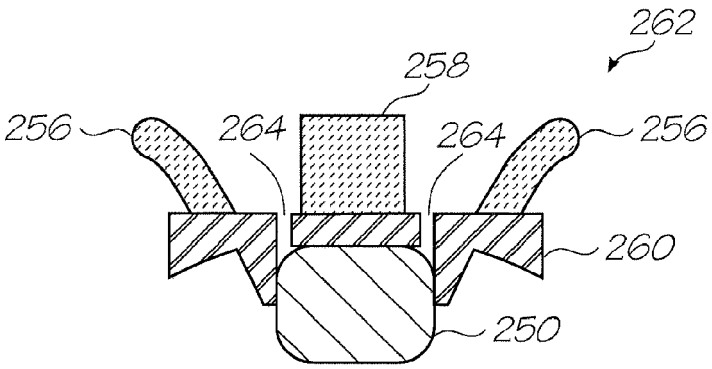

FIG. 32

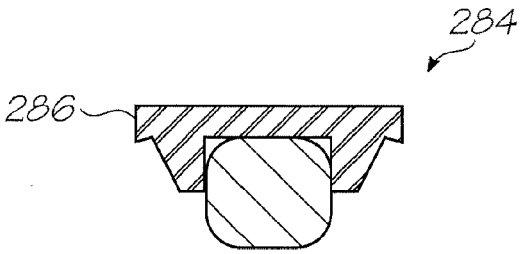

FIG. 33

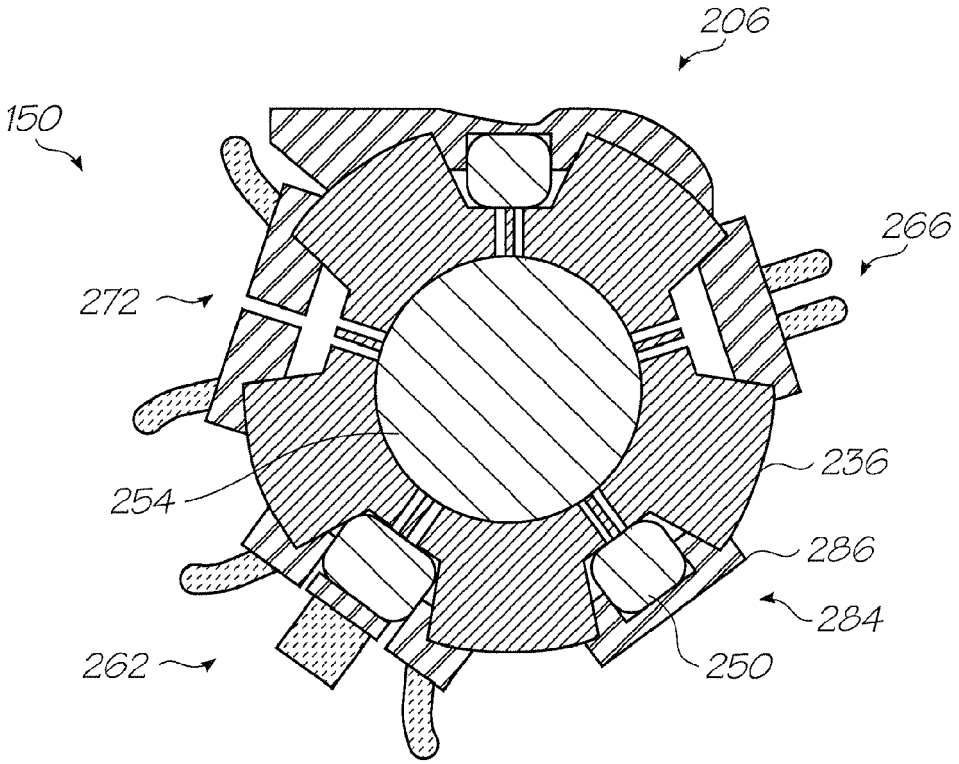

FIG. 34

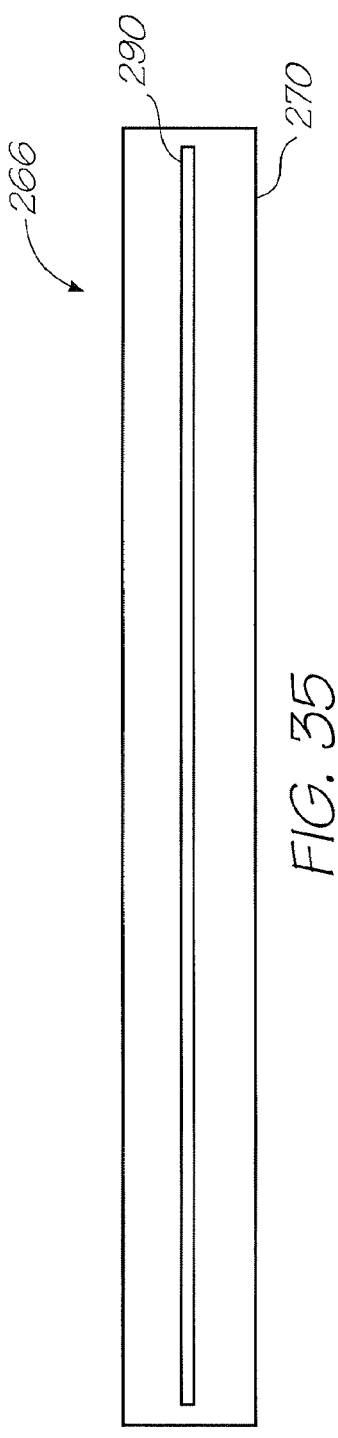

FIG. 35

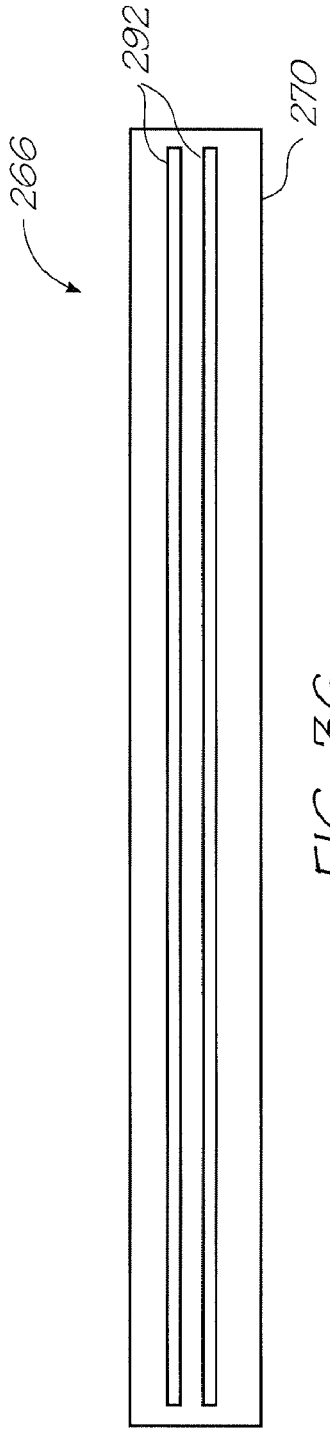

FIG. 36

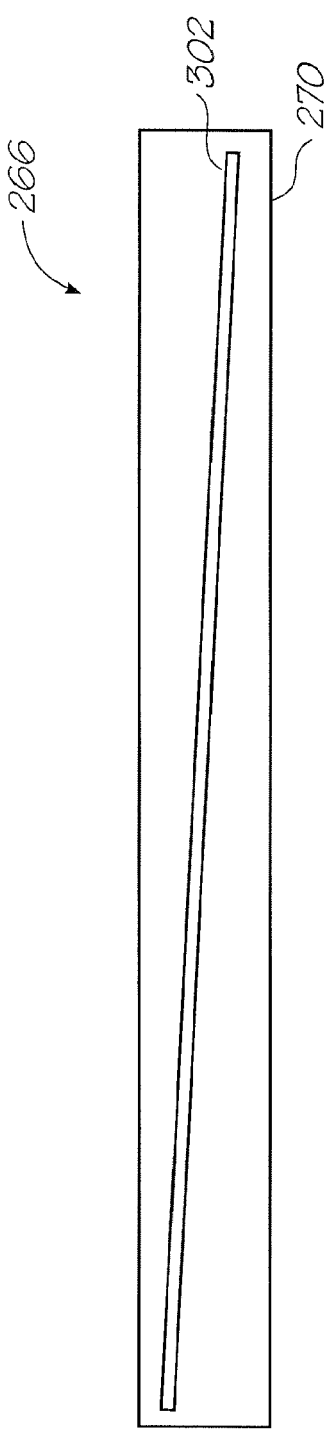

FIG. 37

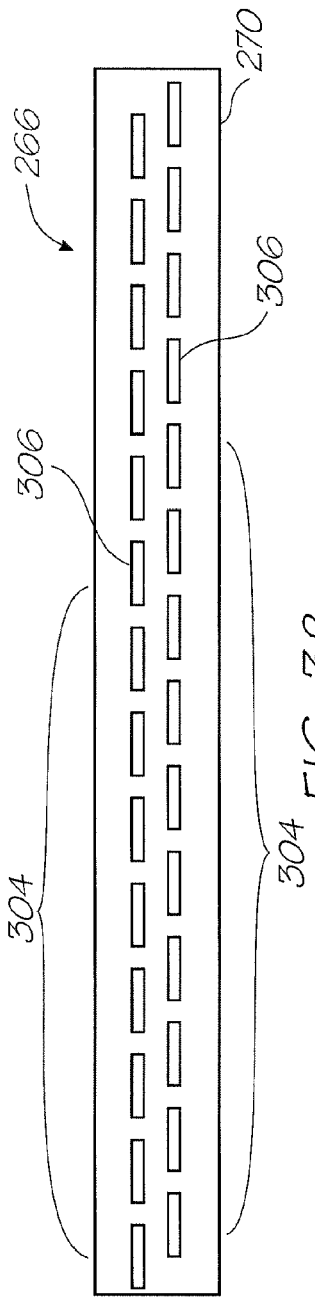

FIG. 38

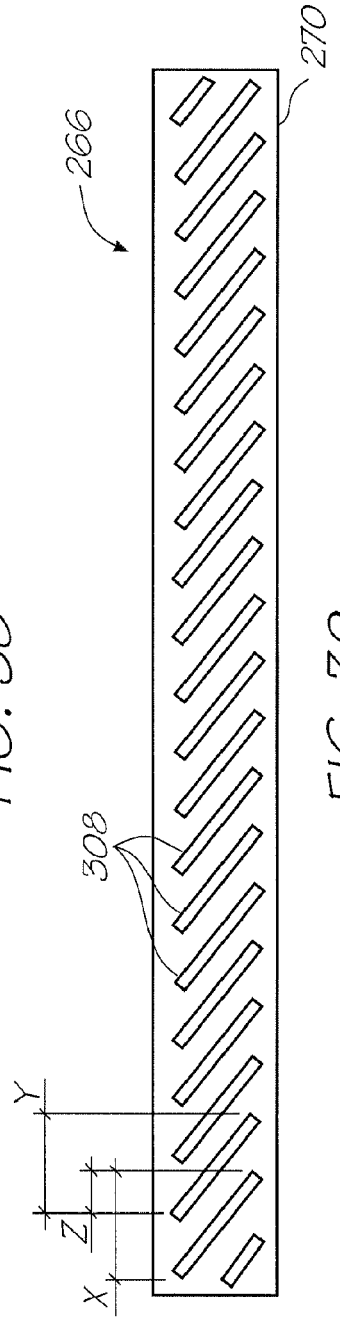

FIG. 39

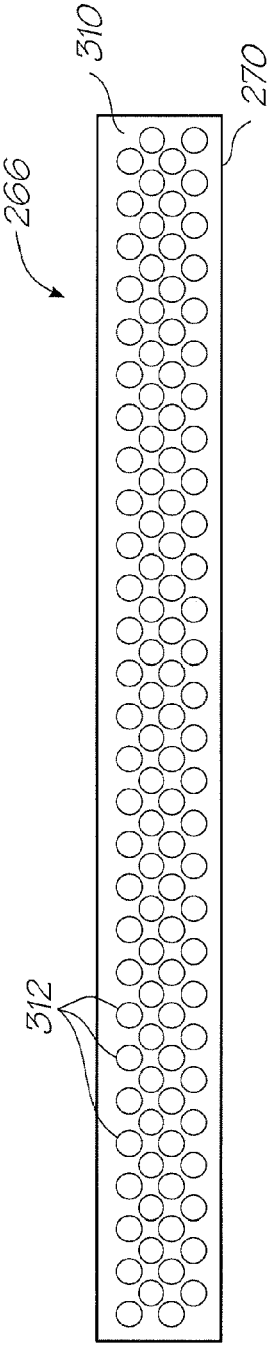

FIG. 40

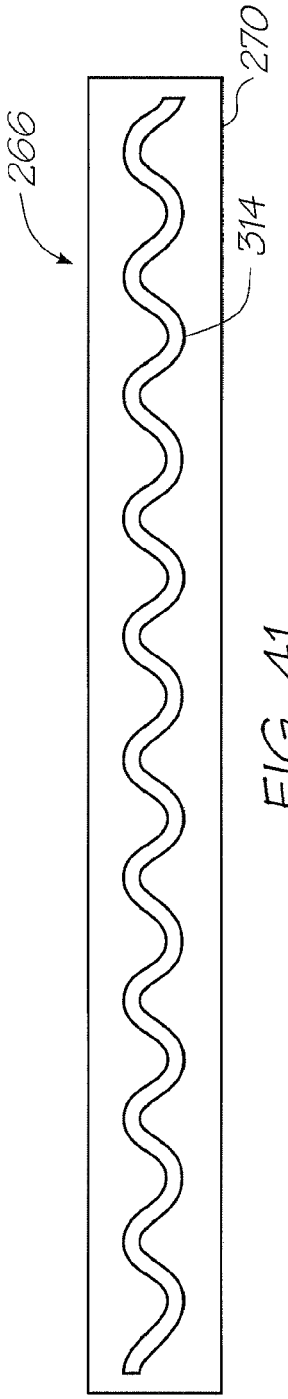

FIG. 41

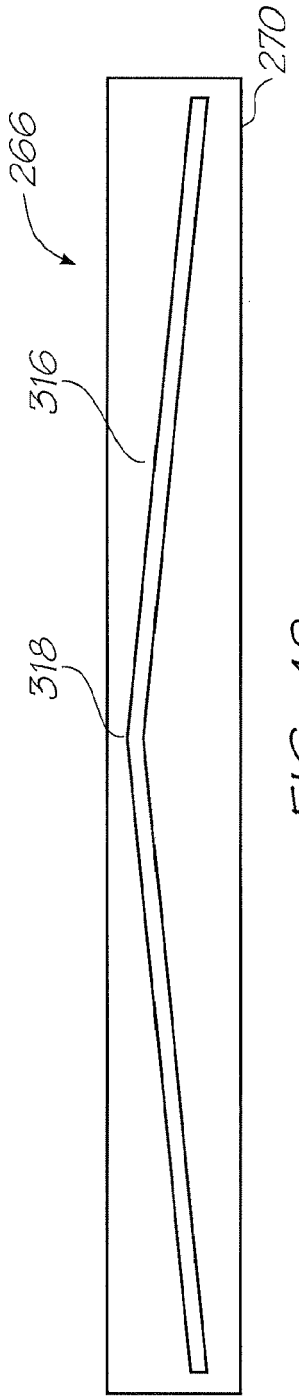

FIG. 42

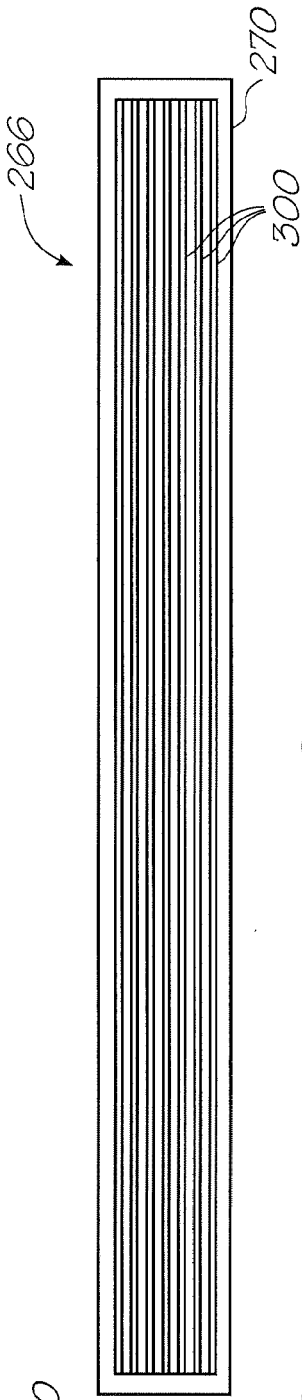

FIG. 43A

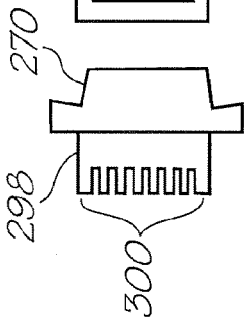

FIG. 43B

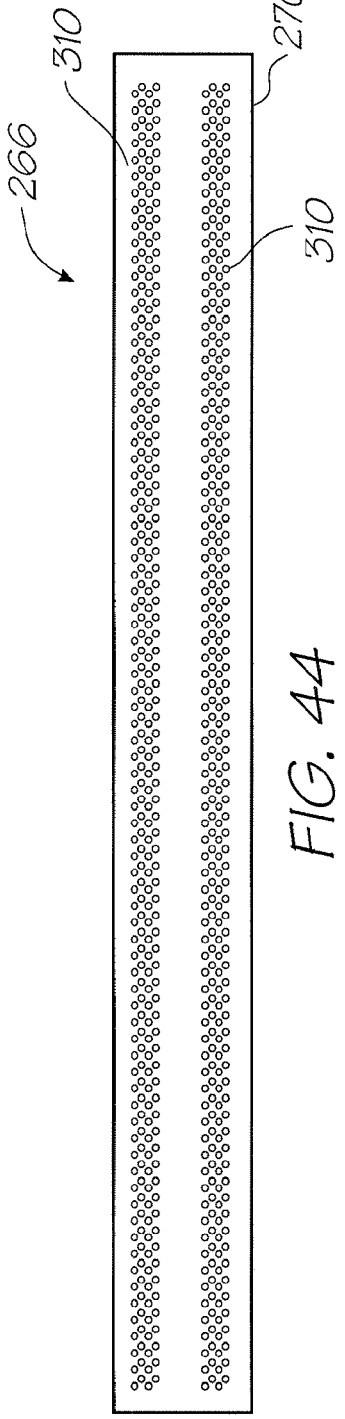

FIG. 44

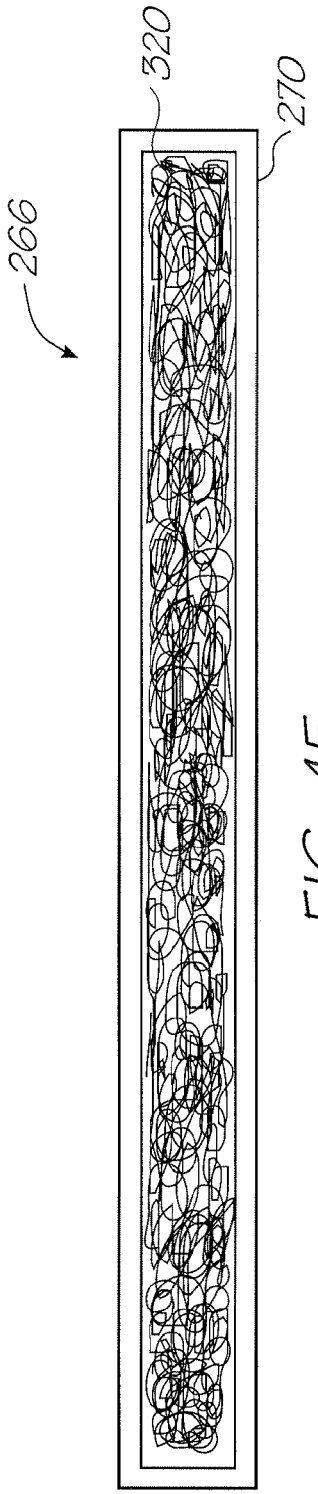

FIG. 45

FIG. 46

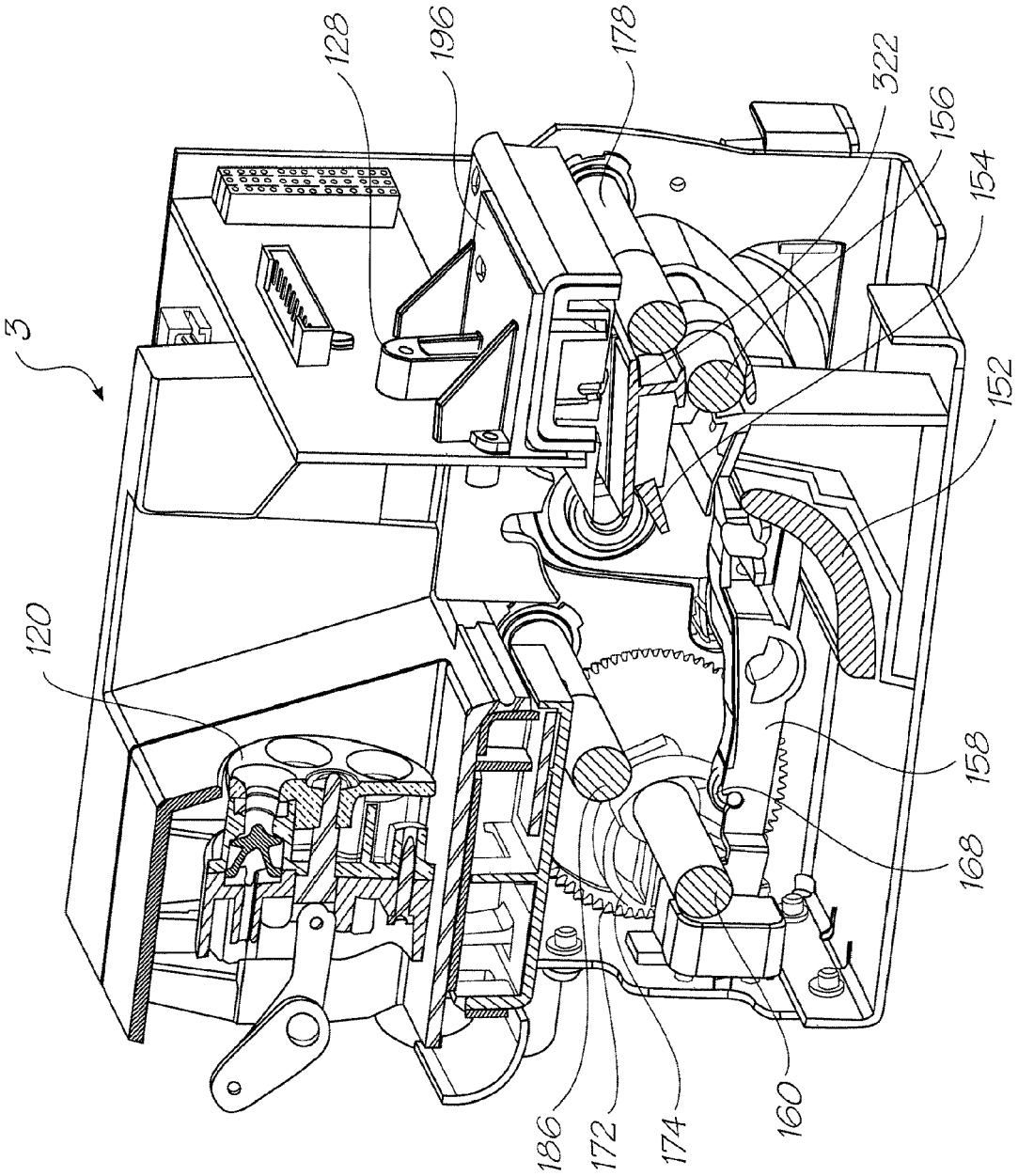

FIG. 47

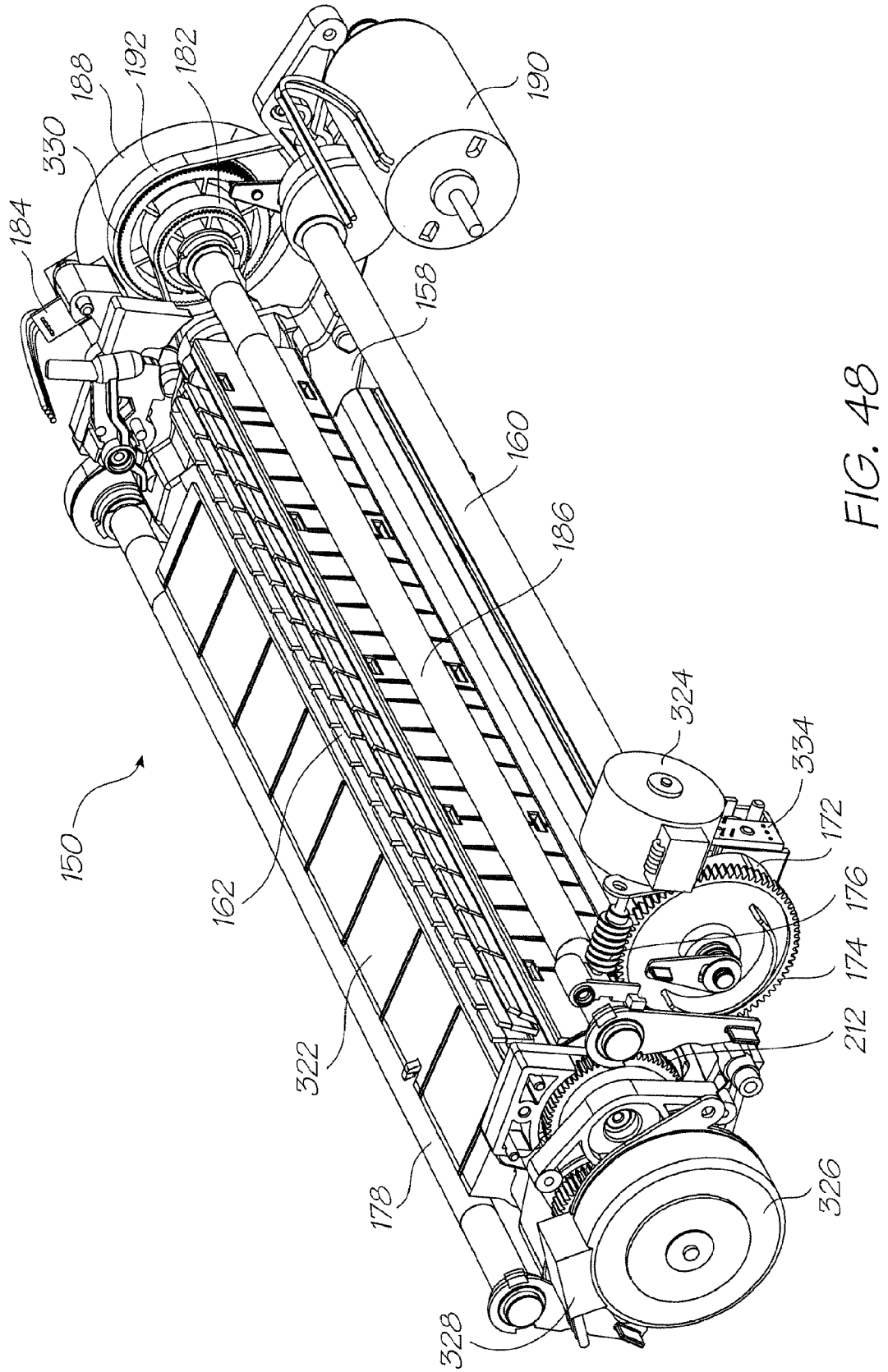
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FIG. 48

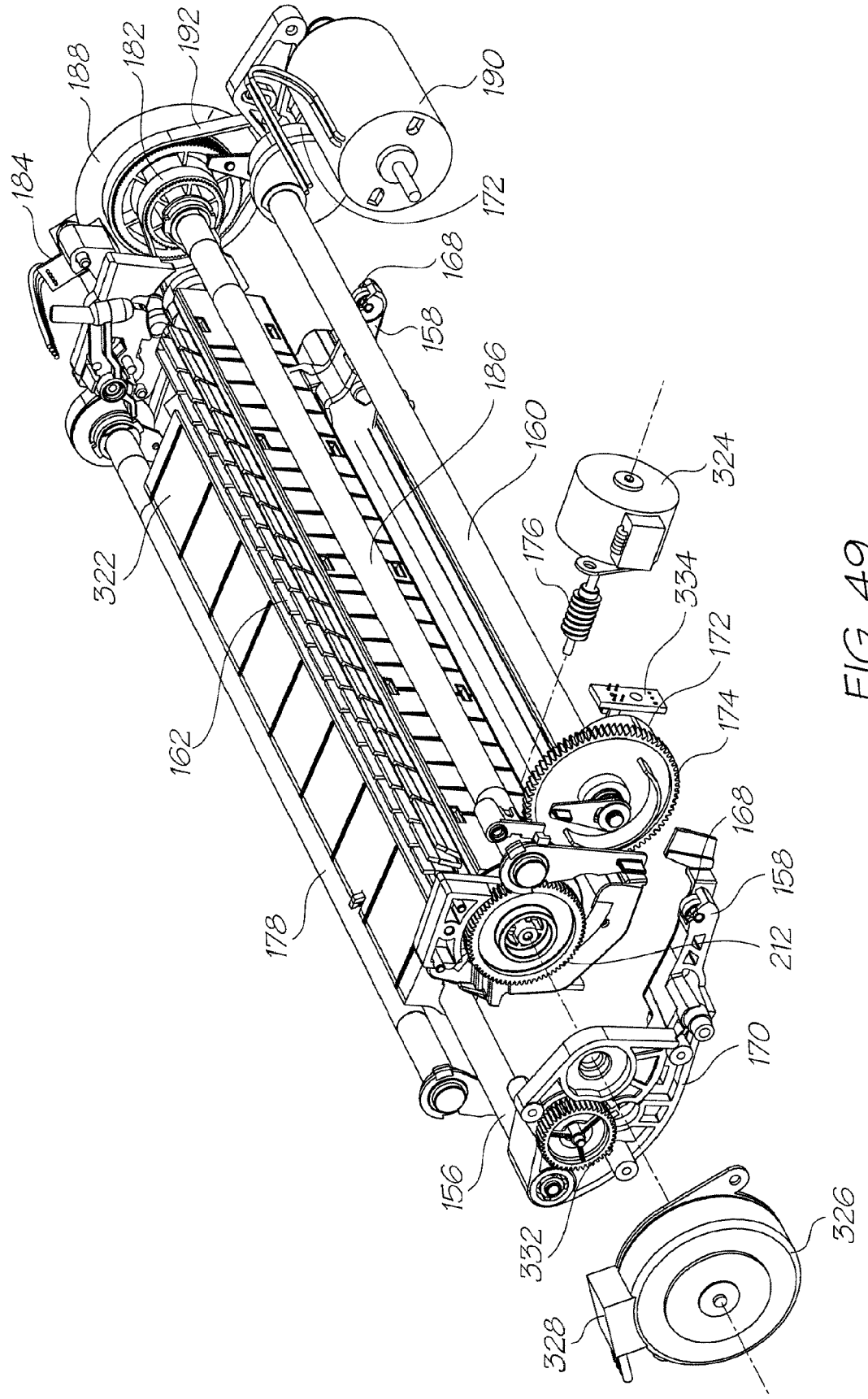
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FIG. 49

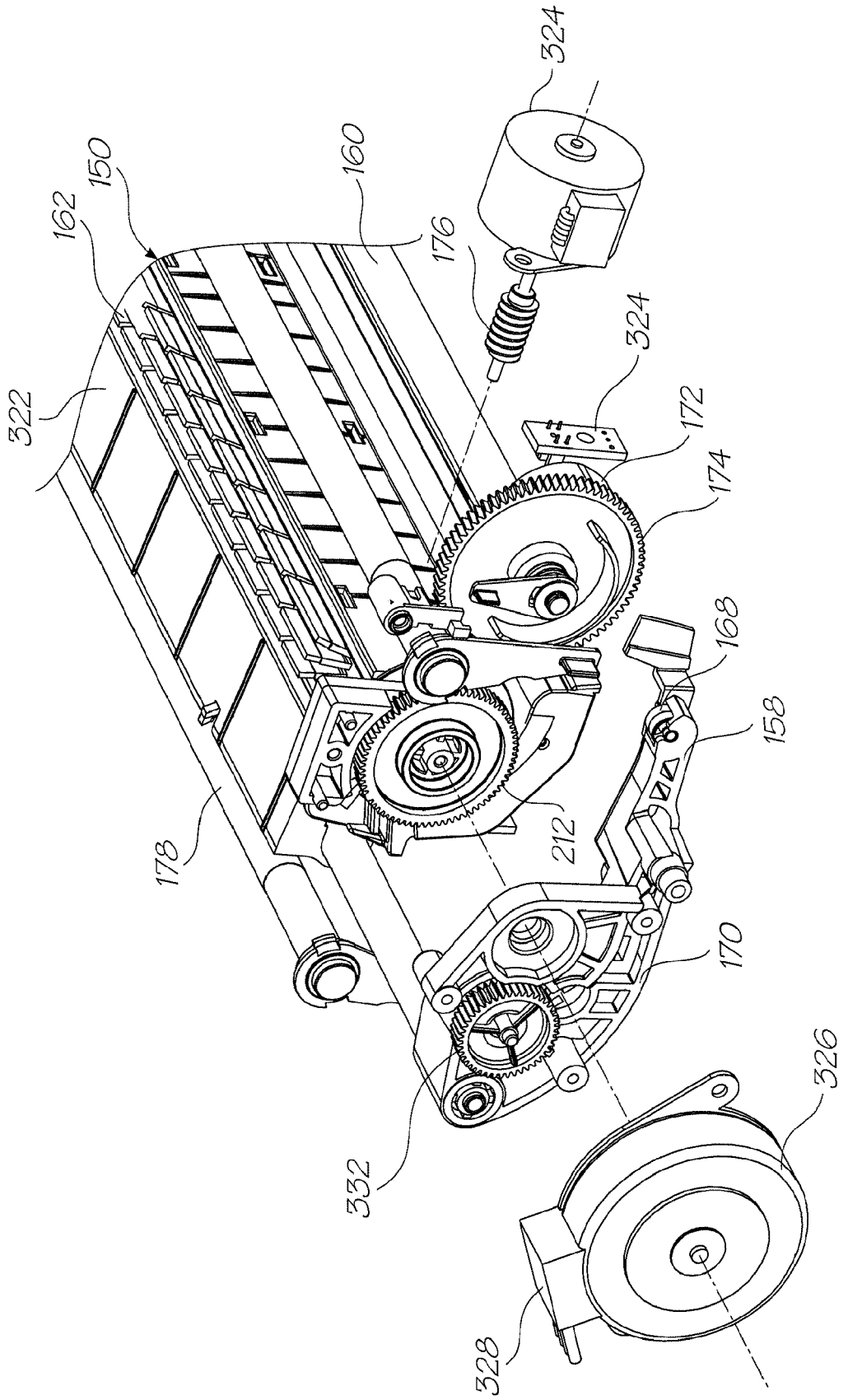
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FIG. 50

REFERENCES CITED IN THE DESCRIPTION

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