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(54) Apparatus and method for applying an ink image to a receiving material

Gerät und Verfahren zum Auftragen eines Tintenbildes auf ein Aufzeichnungsmaterial

Dispositif et procédé pour appliquer une image d'encre sur un matériau récepteur

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Description

[0001] The invention relates to an apparatus for applying an ink image to a receiving material. In particular the invention relates to copiers or printers, more particular to photocopiers or inkjet printers, wherein the receiving material is retained against a carrier plate. The invention further relates to a method for applying an ink image to a receiving material.

[0002] An apparatus according to the preamble of claim 1 and a method according to the preamble of claim 22 are known from the document US 6 270 215 B1.

[0003] An apparatus for keeping a receiving material flat against a carrier plate during the application of an ink image thereto is generally known. The carrier plate is, for example, provided with V-shaped channels, which extend in the direction in which the receiving material is movable stepwise over the carrier plate. Ribs which separate the channels from one another are provided with suction openings in order to draw bubbles, which are formed by moisture absorption in the receiving material, into the channels by vacuum pressure, in order to prevent said bubbles from coming into contact there with ink application means which are flatly movable over the carrier plate.

[0004] The receiving material is pulled against the carrier plate with considerable force so that it is possible to ensure with a great degree of certainty that parts of the receiving material, particularly bubbles projecting in the direction of the ink application means, remain out of contact with the ink application means.

[0005] A disadvantage of the known apparatus is that the ink images on some receiving materials are distorted due to, for example, locally occurring line broadening and density variations in area-fills.

[0006] An object of the invention is to improve on this.

[0007] A further object of the invention is to provide an apparatus having an improved control over the process of the application of an ink image onto the receiving material in order to, at least, reduce the distortions mentioned above.

[0008] From one aspect, the invention provides an apparatus for applying an ink image to a receiving material adapted to be advanced in a direction of advance, comprising:

ink application means for applying an ink image to a strip of receiving material, which strip extends in a direction transverse to the direction of advance of the receiving material, wherein the ink application means are movable over the strip of receiving material,
carrier means for keeping said strip in a predetermined position with respect to the ink application means, which carrier means comprise a carrier plate for carrying said strip, said carrier plate having recesses and said carrier plate being provided with holes,

vacuum means for sucking away air via said holes from the space between the carrier plate and a strip of receiving material lying on the carrier plate, and correction means for correcting local variations in the distance between the receiving material and the ink application means.

[0009] Some receiving materials, particularly slack or compliant receiving materials, are pulled into the recesses to some extent due to the vacuum pressure. On the one hand this is favourable since it reduces the extent to which bubbles project in the direction of the ink application means. On the other hand the sagging of the receiving material into the recesses may result in positioning errors in the ink image.

[0010] For example, if a line of equidistant dots is to be printed onto the receiving material, the ink image of these dots is distorted when the line crosses a part of the receiving material that has sagged into a recess. In the direction of movement of the ink application means, the distance between the dots on the receiving material will increase when the ink application means move over a downward slope of the sagged receiving material. This distance will decrease when the ink application means move over an upward slope of the sagged receiving material. Since this distortion of the ink image is repeated in each strip of receiving material, these distortions add up to form a pattern in the direction of advance of the receiving material.

[0011] Moreover, the carrier plate can be provided with a series of regularly spaced recesses or channels as known in the art. As a consequence of this, the above-mentioned distortions appear around the position of each recess, so that these distortions add up to form a longitudinal wave pattern in a direction perpendicular to the direction of advance of the receiving material.

[0012] Providing the apparatus for applying an ink image to a receiving material with correction means for, at least partially, correcting local variations in the distance between the receiving material and the ink application means, may result in a substantial improvement of the ink image due to the reduction of the misalignment of the ink dots which make up the ink image.

[0013] In a first embodiment, the correction means comprise timing means for adjusting the moment of ink release by the ink application means. Local distance variations cause variations in flight time of the ink droplets from the ink application means to the receiving material. Said variations in flight time of the ink droplets can be compensated by adjusting the moment of ink release. For example, when the receiving material has sagged into a recess, the distance between the receiving material and the ink application means is locally enlarged and the flight time of the ink droplet will increase. Advancing the moment of ink release by the ink application means can compensate this increased flight time and can correct the misalignment of the position of the ink droplet due to the sagging of the receiving material into the recess.

[0014] In a further development, the timing means are arranged for advancing the moment of ink release when the ink application means is near a downward slope of a recess, and for delaying the moment of ink release when the ink application means is near an upward slope of a recess. Preferably the advance and delay are defined by an undulatory electronic signal, wherein the leading and tailing edges of the undulatory signal correspond to the downward and upward slopes of the recesses, respectively. The differences in flight time can thus be corrected using a simple electronic correction of the signal that controls the moment of ink release by the ink application means.

[0015] In a further development, the application means are arranged for moving with uniform velocity over the carrier plate. In this case, and in combination with regularly spaced recesses on the carrier plate, the undulatory electronic signal is also regular, and a simple regular electronic wave signal can be used.

[0016] In a second embodiment, the correction means comprise speed adjustment means for adjusting a relative velocity between the ink application means and the carrier plate. In a further development, the speed adjustment means are arranged for reducing the relative velocity when the ink application means is near a downward slope of a recess, and for increasing the relative velocity when the ink application means is near an upward slope of a recess. Due to this variation in relative velocity between the ink application means and the carrier plate, the trajectories of the ink droplets can be adjusted to compensate for said local distance variations between the ink application means and the receiving material.

[0017] This adjustment of the relative velocity between the ink application means and the carrier plate, can be carried out with the speed adjustment means which comprise translation means for moving the carrier plate in the direction substantially parallel to the direction of the strip of receiving material. In a further development, the translation means are arranged for a reciprocating movement of the carrier plate. Such a translation means for moving the carrier plate has the advantage that no changes have to be made to the ink application means, and that the known ink application means can be used in the apparatus of the invention.

[0018] Alternatively, the speed adjustment means comprise means for adjusting the velocity of the ink application means. This adjustment of the velocity of the application means may be defined by an undulatory electronic signal, wherein the leading and tailing edges of the undulatory signal correspond to the downward and upward slopes of the recesses, respectively. The variation of the velocity can thus be achieved by a simple electronic correction of a signal for controlling the velocity of the ink application means.

[0019] The above-mentioned means for adjusting the velocity of the ink application means and the translation means for moving the carrier plate in the direction substantially parallel to the direction of the strip of receiving

material, can also be combined. In this case the required adjustment of the relative velocity between the ink application means and the carrier plate can be divided between said means for adjusting the velocity of the ink application means and said translation means. In this way the amount of adjustment of each of these means can be reduced. In particular, the velocity of the translation means for moving the carrier plate can be reduced.

[0020] A further advantage of the above mentioned first and second embodiments is that the distance between the carrier plate and the ink application means is not affected by the correction means. Thus the risk that the receiving material may come into contact with the ink application means is as low as in the prior art.

[0021] In a third embodiment the correction means comprise adjustment means for locally adjusting the distance between the ink application means and the carrier plate. In a further development, this adjustment results in essentially a constant distance between the ink application means and the receiving material. This adjustment of the distance may also be defined by an undulatory electronic signal where the leading and tailing edges of the undulatory signal correspond with downward and upward slopes of the recesses.

[0022] In a further development, the adjustment means comprise first movement means for moving the carrier plate in a direction for adjusting a distance between the ink application means and the carrier plate. The adjustment means may also, or in addition, comprise second movement means for moving the ink application means in a direction for adjusting the distance between the ink application means and the carrier plate. In an apparatus comprising first and second movement means, the extent of adjustment can be divided between these two movement means, thereby reducing the required amount of adjustment of each of these movement means.

[0023] In a preferred embodiment the apparatus further comprises controlling means for controlling the correction means depending on of at least one of the following characteristics selected from the group comprising: receiving material characteristics, ink characteristics, ink image characteristics, print mode, carrier plate characteristics, distance between the ink application means and the carrier plate, and the velocity of the ink application means with respect to the carrier plate. Using at least one of these characteristics, the extent to which the receiving material is pulled into the recesses, can be estimated, derived or determined. Subsequently, the controlling means control the correction means for correcting this estimated extent of sagging of the receiving material into the recesses. The use of such a controlling means results in a very flexible apparatus, which can easily adapt to various conditions such as, for example, various different types of receiving materials.

[0024] In a further development, the controlling means comprise input means for inputting said characteristics. One or more of said characteristics or values defining the state of said characteristics may be inputted or mod-

ified via said input means when changing, for example, from one type of receiving material to an other type of receiving material or from one type of printing ink to an other type of printing ink. Said values may be numerical values, but may also comprise other characters, such as alphanumeric characters.

[0025] The receiving material characteristics may comprise at least one of the characteristics selected from the group comprising: the grade, the type, the thickness, the moisture content, the weight or substance per unit area, and the sizing.

[0026] The ink characteristics may comprise at least one of the characteristics selected from the group comprising: the viscosity, the water or solvent content of the ink, and the wetting characteristics of the ink.

[0027] The ink image characteristics may comprise at least one of the characteristics selected from the group comprising: area fraction covered by ink, pixel density.

[0028] The print mode may comprise at least one of the following selected from the group comprising: last mode, normal mode, and best mode. In the last mode, the ink image is printed in one single move of the ink application means over the strip of receiving material. Whereas in the normal mode, the ink image is printed in a reciprocating movement of the ink application means over the strip of receiving material. In the best mode, the ink image is printed in more than one forward motion or reciprocating motion.

[0029] The carrier plate characteristics may comprise at least one of the characteristics selected from the group comprising: configuration of the recesses, profile of the recesses and magnitude of the vacuum pressure generated by the vacuum means.

[0030] In a further development, the apparatus comprises detection means for detecting the positions of the recesses with respect to a path of the ink application means. The information about the relative position of the recesses with respect to the path of the application means can then be transferred to the controlling means. This information can be used for controlling the correction means as described above. Said detection means can be used for calibration or recalibration of the correction means and may for example be used in a start-up phase of the apparatus according to the invention for detecting the relative positions of the recesses with respect to the actual path of the ink application means.

[0031] From a second aspect, the invention provides a method for applying an ink image to a receiving material using an apparatus adapted to advance the receiving material in a direction of advance, wherein the method comprises the steps of:

placing a strip of receiving material on a carrier means in a predetermined position with respect to an ink application means, which carrier means comprise a carrier plate for carrying said strip, said carrier plate having recesses extending in the direction substantially parallel to the direction of advance of the

receiving material, and said carrier plate being provided with holes,

keeping the strip of receiving material on the carrier means by sucking away air via said holes from the space between the carrier plate and the strip of receiving material lying on the carrier plate using the vacuum means,

applying an ink image to the strip of receiving material using the ink application means, which strip extends in the direction transverse to the direction of advance of the receiving material, and

correcting local variations in the distance between the receiving material and the ink application means using correction means during the movement of the application means over the strip of receiving material.

[0032] Said correction can be performed by adjusting the moment of ink release by the ink application means, using timing means as described above.

[0033] In addition or alternatively said local variations can also be corrected by adjusting the relative velocity with which the ink application means is moved over the carrier plate for applying the ink image to the strip of receiving material.

[0034] Furthermore, adjusting the distance between the ink application means and the carrier plate can correct said local variations.

[0035] In a further development, the local variations in the distance between the receiving material and the ink application means are estimated or determined using at least one of the characteristics selected from the group comprising: ink characteristics, receiving material characteristics, ink image characteristics, print mode, carrier plate characteristics, distance between the ink application means and the carrier plate, and the velocity of the ink application means with respect to the carrier plate. Such characteristics may be inputted into a controlling means for controlling the correction means.

[0036] The invention will be elucidated on the basis of exemplary embodiments shown in the attached drawings, in which:

Figure 1 is a top view of a detail of an apparatus according to the prior art;

Figure 2 is a cross-sectional view of a detail of the carrier means;

Figures 3A, 3B and 3C are schematic representations of exemplary embodiments according to the invention;

Figure 4 is a schematic view of an electronic signal for controlling the correction means; and

Figure 5 is a diagram of the controlling means for controlling the correction means of the invention.

[0037] The apparatus as shown in figure 1 comprises a transport roller 1 with a transport nip 2 in a feed path for feeding a receiving material 3 originating from a stock

(not shown). Roller system 1 is formed by a drivable roller with a diameter of about 80 mm and a number of soft rubber contact pressure rollers with a diameter of about 14 mm to provide a slip-free intermittent transport of the receiving material 3 through the in-line transport nip 2. The feed path in which the transport nip 2 is situated is formed by guide plate 4 over which the receiving material 3 moves. Guide plate 4 is followed in transport direction by a carrier plate 5 which forms a carrying surface for a part of the receiving material 3 which is fed thereon. Printing a part of the receiving material 3 lying on the carrier plate 5 is effected by an ink application means such as an inkjet printhead 6. One or more printheads may be used for applying an ink image to the receiving material 3 in a known manner.

[0038] As shown in figure 1, the carrier plate 5 has a profiled form consisting of V-shaped ribs 7 which extend parallel to the direction of advance of the receiving material 3 over the carrier plate 5. Each rib 7 is formed by a top surface 8, which top surfaces 8 lie in a plane which extends at a short distance d beneath the underside of the printhead 6 (see figures 3A, 3B and 3C). This distance d is herein referred to as the distance between the ink application means 7 and the carrier plate 5.

[0039] Between the ribs 7, recesses 9 are formed which serve to prevent contact between the receiving material 3 on the carrier plate 5 and the printhead 6 moving in a reciprocating motion 10 over the receiving material 3. The receiving material 3 may locally curl up, most likely due to moisture absorption during the printing with an aqueous ink in particular. Any bubbles above the channel shaped recesses 9 can sag therein.

[0040] The carrier plate 5 is provided with holes 12 which are connected beneath the carrier plate 5 to an air chamber 13 which is connected to vacuum means 14 for sucking away air via said holes 12 from the space between the carrier plate 5 and a strip of receiving material 3 lying on the carrier plate 5. In figure 1 these holes 12 are provided in the top surface 8 of the ribs 7. However, these holes 12 may also be provided in the channels 9, as depicted in figure 2. Due to the vacuum pressure between the carrier plate 5 and the receiving material 3, the receiving material 3 is to some extent pulled in the channels 9 as depicted in figure 1. This situation is schematically depicted in the cross-section view of figure 2. Here the depth to which the receiving material 3 sags into the channels 9 is indicated by the symbol X. This depth normally is approximately 1 mm, but may be as large as 3 - 4 mm.

[0041] In order to, at least partially, compensate for the local variations in the distance between the ink application means 6 and the receiving material 3, the apparatus according to the invention comprises correction means as depicted in the figures 3A, 3B and 3C.

[0042] In a first exemplary embodiment as schematically depicted in figure 3A, the apparatus according to the invention is provided with timing means 31 for adjusting the moment of ink release by the printhead 6 during

the motion 10 of the printhead 6 over the receiving material 3 lying on the carrier plate 5.

[0043] In a second exemplary embodiment as schematically depicted in figure 3B, the apparatus of the invention is provided with speed adjustment means 41, 43 for adjusting the relative velocity of the ink application means 7 with respect to the carrier plate 5. This relative velocity can be adjusted by translation means 41 which move the carrier plate 5 in a reciprocating motion 42 in a direction substantially parallel to the direction of the motion 10 of the printhead 6 over the receiving material 3 lying on the carrier plate 5. In addition or alternatively said relative velocity can be adjusted by speed adjustment means 43, which adjust the velocity of the printhead 6 during its motion 10 over the receiving material 3.

[0044] In a third exemplary embodiment as schematically depicted in figure 3C, the apparatus according to the invention is provided with adjustment means 51, 53 for adjusting the distance d between the printhead 6 and the carrier plate 5. This distance d can be adjusted by first movement means 51 for moving the carrier plate 5 in a direction 52 substantially perpendicular to the motion 10 of the printhead 6 over the receiving material 3 lying on the carrier plate 5. In addition or alternatively said distance d can be adjusted by second movement means 53 for moving the printhead 6 in a direction 54 substantially perpendicular to the motion 10 of the printhead 6.

[0045] The positions of the channels 9 with respect to the path of the printhead 6 during its motion 10 over the carrier plate 5 with said channels 9, and the relative velocity with which the printhead 6 moves over the strip of receiving material 3, are known or can be determined. The correction means 31, 41, 43, 51, 53 are controllable by an undulatory electronic signal 60 as depicted in figure 4, wherein the leading 61 and trailing 62 edges of the undulatory signal 60 correspond with downward and upward slopes of the channels 9 (compare with the channels 9 of figure 2).

[0046] The amplitude A of the signal 60 is adjustable depending on the depth X to which the receiving material 3 sags into the channels 9. To this end, the above-mentioned exemplary embodiments of the apparatus according to the invention can be provided with controlling means 70 as depicted in figure 5. Said controlling means comprises a microprocessor 71 and memory means 72. Characteristics of the print process are stored in said memory means 72. Such characteristics of the print process may comprise: receiving material 3 characteristics, ink characteristics, ink image characteristics, print mode, carrier plate 5 characteristics, distance between the printhead 6 and the carrier plate 5, and the velocity of the printhead 6 with respect to the carrier plate 5. Coupled to said controlling means 70 is a keyboard control panel 74 for inputting or changing said characteristics in the memory means 72. When, for example, the first receiving material is replaced by a second receiving material with different characteristics, the characteristics of the first receiving material as stored in the memory means 72 can

be replaced with the characteristics of the second receiving material.

[0047] The microprocessor 71 can determine or derive the depth X to which the receiving material 3 will sag into the channels 9 from said characteristics of the print process as stored in the memory means 72. In response to this information, the microprocessor 71 produces or adjusts a control signal, for example the amplitude Amp of the signal 60 as depicted in figure 4, which control signal is sent via an output 75 of the controlling means 70 to an input 35, 45, 46, 55, 56 of the correction means 31, 41, 43, 51, 53.

Claims

1. Apparatus for applying an ink image to a receiving material (3) adapted to be advanced in a direction of advance, comprising:

ink application means (6) for applying an ink image to a strip of receiving material (3), which strip extends in a direction transverse to the direction of advance of the receiving material, wherein the ink application means (6) are movable over the strip of receiving material (3), carrier means for keeping said strip in a predetermined position with respect to the ink application means, which carrier means comprise a carrier plate (5) for carrying said strip, said carrier plate (5) having recesses (9) and said carrier plate (5) being provided with holes (12), vacuum means (14) for sucking away air via said holes (12) from the space between the carrier plate (5) and a strip of receiving material (3) lying on the carrier plate (5), **characterised by** correction means for correcting local variations in the distance between the receiving material (3) and the ink application means (6).

2. Apparatus as claimed in claim 1, wherein the correction means comprise timing means for adjusting the moment of ink release by the ink application means.
3. Apparatus as claimed in claim 2, wherein the timing means are arranged for advancing the moment of ink release when the ink application means is near a downward slope of a recess, and for delaying the moment of ink release when the ink application means is near an upward slope of a recess.
4. Apparatus as claimed in claims 2 or 3, wherein the ink application means are arranged for moving with uniform velocity over the carrier plate.
5. Apparatus as claimed in any one of the preceding claims, wherein the correction means comprise speed adjustment means for adjusting a relative ve-

locity between the ink application means and the carrier plate.

6. Apparatus as claimed in claim 5, wherein the speed adjustment means are arranged for reducing the relative velocity when the ink application means is near a downward slope of a recess, and for increasing the relative velocity when the ink application means is near an upward slope of a recess.
7. Apparatus as claimed in claims 5 or 6, wherein the speed adjustment means comprise translation means for moving the carrier plate in the direction substantially parallel to the direction of the strip of receiving material.
8. Apparatus as claimed in claim 7, wherein the translation means are arranged for a reciprocating movement of the carrier plate.
9. Apparatus as claimed in claims 5, 6, 7 or 8, wherein the speed adjustment means comprise means for adjusting the velocity of the ink application means.
10. Apparatus as claimed in any one of the preceding claims, wherein the correction means comprise adjustment means for adjusting the distance between the ink application means and the carrier plate.
11. Apparatus as claimed in claim 10, wherein the adjustment means comprise first movement means for moving the carrier plate in a direction for adjusting the distance between the ink application means and the carrier plate.
12. Apparatus as claimed in claims 10 or 11, wherein the adjustment means comprise second movement means for moving the ink application means in a direction for adjusting the distance between the ink application means and the carrier plate.
13. Apparatus as claimed in any one of the preceding claims, wherein the correction means are controllable by an undulatory electronic signal, wherein the leading and tailing edges of the undulatory signal correspond with downward and upward slopes of the recesses.
14. Apparatus as claimed in any one of the preceding claims, wherein the apparatus further comprises controlling means for controlling the correction means depending on at least one of the characteristics selected from the group comprising: receiving material characteristics, ink characteristics, ink image characteristics, print mode, carrier plate characteristics, distance between the ink application means and the carrier plate, and the velocity of the ink application means with respect to the carrier plate.

15. Apparatus as claimed in claim 14, wherein the receiving material characteristics comprise at least one of the characteristics selected from the group comprising: the grade, the type, the thickness, the moisture content, the weight or substance per unit area, and the sizing. 5
16. Apparatus as claimed in claim 14, wherein the ink characteristics comprise at least one of the characteristics selected from the group comprising: the viscosity, wetting characteristics of the ink. 10
17. Apparatus as claimed in claim 14, wherein the ink image characteristics comprise at least one of the characteristics selected from the group comprising: area fraction covered by ink, pixel density. 15
18. Apparatus as claimed in claim 14, wherein the print mode comprises at least one selected from the group comprising: last mode, normal mode, and best mode. 20
19. Apparatus as claimed in claim 14, wherein the carrier plate characteristics comprise at least one of the characteristics selected from the group comprising: configuration and/or profile of the recesses, magnitude of a vacuum pressure generated by the vacuum means, 25
20. Apparatus as claimed in claim 19, wherein the apparatus further comprises detection means for detecting the positions of the recesses with respect to a path of the ink application means. 30
21. Apparatus as claimed in any one of the claims 14 - 20, wherein the controlling means comprise input means for inputting said at least one characteristic. 35
22. Method for applying an ink image to receiving material (3) using an apparatus adapted to advance the receiving material (3) in a direction of advance, wherein the method comprises the steps of: 40
- placing a strip of receiving material (3) on a carrier means in a predetermined position with respect to an ink application means (6), which carrier means comprise a carrier plate (5) for carrying said strip, said carrier plate (5) having recesses (9) and said carrier plate (5) being provided with holes (12), 45
- keeping the strip of receiving material (3) on the carrier means by sucking away air via said holes (12) from the space between the carrier plate (5) and the strip of receiving material (3) lying on the carrier plate (5) using vacuum means (14), 50
- applying an ink image to a strip of receiving material (3) using an ink application means (6), 55

which strip extends in a direction transverse to the direction of advance of the receiving material (3), **characterised by** correcting local variations in the distance between the receiving material (3) and the ink application means (6) using correction means.

23. Method as claimed in claim 22, wherein the correction means is that comprised in the apparatus according to any one of claims 1-21.

Patentansprüche

1. Gerät zum Auftragen eines Tintenbildes auf ein Empfangsmaterial (3), das dazu eingerichtet ist, in einer Transportrichtung transportiert zu werden, mit:
- einer Tintenauftrageinrichtung (6) zum Auftragen eines Tintenbildes auf einen Streifen des Empfangsmaterials (3), welcher Streifen sich in einer Richtung quer zu der Transportrichtung des Empfangsmaterials erstreckt, wobei die Tintenauftrageinrichtung (6) über den Streifen des Empfangsmaterials (3) bewegbar ist, einer Trägereinrichtung zum Halten des Streifens in einer vorbestimmten Position in Bezug auf die Tintenauftrageinrichtung, welche Trägereinrichtung eine Trägerplatte (5) zum Tragen des Streifens aufweist, wobei die Trägerplatte (5) Ausnehmungen (9) hat und die Trägerplatte (5) mit Löchern (12) versehen ist, einer Vakuumeinrichtung (14) zum Absaugen von Luft über die Löcher (12) aus dem Raum zwischen der Trägerplatte (5) und einem auf der Trägerplatte (5) liegenden Streifen des Empfangsmaterials (3), **gekennzeichnet durch** eine Korrektureinrichtung zur Korrektur lokaler Variationen im Abstand zwischen dem Empfangsmaterial (3) und der Tintenauftrageinrichtung (6).
2. Gerät nach Anspruch 1, bei dem die Korrektureinrichtung eine Zeitsteuereinrichtung zum Einstellen des Augenblicks der Tintenfreigabe durch die Tintenauftrageinrichtung aufweist.
3. Gerät nach Anspruch 2, bei dem die Zeitsteuereinrichtung dazu eingerichtet ist, den Moment der Tintenfreigabe vorzuverlegen, wenn die Tintenauftrageinrichtung sich in der Nähe eines abwärts geneigten Hanges einer Ausnehmung befindet, und den Moment der Tintenfreigabe zu verzögern, wenn die Tintenauftrageinrichtung sich in der Nähe eines aufwärts geneigten Hanges einer Ausnehmung befindet.
4. Gerät nach Anspruch 2 oder 3, bei dem die Tinten-

auftrageinrichtung dazu eingerichtet ist, sich mit gleichförmiger Geschwindigkeit über die Trägerplatte zu bewegen.

5. Gerät nach einem der vorstehenden Ansprüche, bei dem die Korrektoreinrichtung eine Geschwindigkeitseinstelleinrichtung aufweist zum Einstellen einer Relativgeschwindigkeit zwischen der Tintenauftrageinrichtung und der Trägerplatte. 5
6. Gerät nach Anspruch 5, bei dem die Geschwindigkeitseinstelleinrichtung dazu eingerichtet ist, die Relativgeschwindigkeit zu reduzieren, wenn sich die Tintenauftrageinrichtung in der Nähe eines abwärts geneigten Hanges einer Ausnehmung befindet, und die Relativgeschwindigkeit zu erhöhen, wenn sich die Tintenauftrageinrichtung in der Nähe eines aufwärts geneigten Hanges einer Ausnehmung befindet. 10
7. Gerät nach Anspruch 5 oder 6, bei dem die Geschwindigkeitseinstelleinrichtung eine Translationseinrichtung zum Bewegen der Trägerplatte in der Richtung im wesentlichen parallel zu der Richtung des Streifens des Empfangsmaterials aufweist. 15
8. Gerät nach Anspruch 7, bei dem die Translationseinrichtung für eine hin- und hergehende Bewegung der Trägerplatte eingerichtet ist. 20
9. Gerät nach Ansprüchen 5, 6, 7 oder 8, bei dem die Geschwindigkeitseinstelleinrichtung eine Einrichtung zum Einstellen der Geschwindigkeit der Tintenauftrageinrichtung aufweist. 25
10. Gerät nach einem der vorstehenden Ansprüche, bei dem die Korrektoreinrichtung eine Einstelleinrichtung zum Einstellen des Abstands zwischen der Tintenauftrageinrichtung und der Trägerplatte aufweist. 30
11. Gerät nach Anspruch 10, bei dem die Einstelleinrichtung einen ersten Antrieb zum Bewegen der Trägerplatte in einer Richtung zum Einstellen des Abstands zwischen der Tintenauftrageinrichtung und der Trägerplatte aufweist. 35
12. Gerät nach Anspruch 10 oder 11, bei dem die Einstelleinrichtung einen zweiten Antrieb zum Bewegen der Tintenauftrageinrichtung in einer Richtung zum Einstellen des Abstands zwischen der Tintenauftrageinrichtung und der Trägerplatte aufweist. 40
13. Gerät nach einem der vorstehenden Ansprüche, bei dem die Korrektoreinrichtung durch ein wellenförmiges elektronisches Signal steuerbar ist, wobei die vorauslaufenden und nachlaufenden Flanken des wellenförmigen Signals mit abwärts und aufwärts geneigten Hängen der Ausnehmungen korrespon-

dieren.

14. Gerät nach einem der vorstehenden Ansprüche, bei dem das Gerät weiterhin eine Steuereinrichtung aufweist zum Steuern der Korrektoreinrichtung in Abhängigkeit von wenigstens einer der Charakteristiken, die ausgewählt sind aus der Gruppe, die umfasst: Empfangsmaterialcharakteristiken, Tintencharakteristiken, Tintenbildcharakteristiken, Druckmodus, Trägerplattencharakteristiken, Abstand zwischen der Tintenauftrageinrichtung und der Trägerplatte, und Geschwindigkeit der Tintenauftrageinrichtung relativ zu der Trägerplatte. 45
15. Gerät nach Anspruch 14, bei dem die Empfangsmaterialcharakteristiken wenigstens eine der Charakteristiken umfassen, die ausgewählt sind aus der Gruppe, die umfasst: die Qualität, den Typ, die Dicke, den Feuchtigkeitsgehalt, Gewicht oder Materialmenge je Flächeneinheit, und die Abmessungen. 50
16. Gerät nach Anspruch 14, bei dem die Tintencharakteristiken wenigstens eine der Charakteristiken umfassen, die ausgewählt sind aus der Gruppe umfassend: die Viskosität, Benetzungscharakteristik der Tinte. 55
17. Gerät nach Anspruch 14, bei dem die Tintenbildcharakteristiken wenigstens eine der Charakteristiken umfassen, die ausgewählt sind aus der Gruppe umfassend: mit Tinte bedeckter Flächenanteil, Pixeldichte.
18. Gerät nach Anspruch 14, bei dem der Druckmodus wenigstens einen Modus umfasst, der ausgewählt ist aus der Gruppe umfassend: letzter Modus, Normalmodus, bester Modus.
19. Gerät nach Anspruch 14, bei dem die Trägerplattencharakteristiken wenigstens eine der Charakteristiken umfassen, die ausgewählt sind aus der Gruppe umfassend: Konfiguration und/oder Profil der Ausnehmungen, Größe eines von der Vakuumeinrichtung erzeugten Unterdruckes.
20. Gerät nach Anspruch 19, bei dem das Gerät weiterhin eine Detektoreinrichtung zum Detektieren der Positionen der Ausnehmungen in Bezug auf eine Bewegungsbahn der Tintenauftrageinrichtung aufweist.
21. Gerät nach einem der Ansprüche 14 - 20, bei dem die Steuereinrichtung eine Eingabeeinrichtung zum Eingeben der genannten wenigstens einen Charakteristik aufweist.
22. Verfahren zum Auftragen eines Tintenbildes auf ein Empfangsmaterial (3) unter Verwendung eines Ge-

rätes, das dazu eingerichtet ist, das Empfangsmaterial (3) in einer Transportrichtung zu transportieren, welches Verfahren die folgenden Schritte aufweist:

Platzieren eines Streifens des Empfangsmaterials (3) auf einer Trägereinrichtung in einer vorbestimmten Position in Bezug auf eine Tintenauftrageinrichtung (6), wobei die Trägereinrichtung eine Trägerplatte (5) zum Tragen des Streifens aufweist, die Trägerplatte (5) Ausnehmungen (9) hat und die Trägerplatte (5) Löcher (12) hat,
Halten des Streifens des Empfangsmaterials (3) auf der Trägereinrichtung durch Absaugen von Luft über die Löcher (12) aus dem Raum zwischen der Trägerplatte (5) und dem Streifen des Empfangsmaterials (3), der auf der Trägerplatte (5) liegt, mit Hilfe einer Vakuumeinrichtung (14),
Auftragen eines Tintenbildes auf einen Streifen des Empfangsmaterials (3) unter Verwendung einer Tintenauftrageinrichtung (6), wobei sich der Streifen in einer Richtung quer zur Transportrichtung des Empfangsmaterials (3) erstreckt, **gekennzeichnet durch**
Korrigieren lokaler Variationen im Abstand zwischen dem Empfangsmaterial (3) und der Tintenauftrageinrichtung (6) unter Verwendung einer Korrektureinrichtung.

23. Verfahren nach Anspruch 22, bei dem die Korrektureinrichtung diejenige ist, die in dem Gerät nach einem der Ansprüche 1 bis 21 enthalten ist.

Revendications

1. Appareil d'application d'une image d'encre à un matériau récepteur (3) qui est à même d'être avancé dans un sens d'avancement, comprenant :

des moyens d'application d'encre (6) pour appliquer une image d'encre à une bande de matériau récepteur (3), ladite bande s'étendant dans une direction transversale à la direction d'avancement du matériau récepteur, dans lequel les moyens d'application d'encre (6) sont mobiles par-dessus la bande de matériau récepteur (3),
des moyens de transport pour maintenir ladite bande dans une position prédéterminée par rapport aux moyens d'application d'encre, lesdits moyens de transport comprenant une plaque de transport (5) pour acheminer ladite bande, ladite plaque de transport (5) ayant des cavités (9) et ladite plaque de transport (5) étant pourvue de trous (12),
des moyens à vide (14) pour aspirer via lesdits

trous (12) l'air de l'espace compris entre la plaque de transport (5) et une bande de matériau récepteur (3) se trouvant sur la plaque de transport (5),

caractérisé par :

des moyens de correction permettant de corriger les variations locales de la distance entre le matériau récepteur (3) et les moyens d'application d'encre (6).

2. Appareil selon la revendication 1, dans lequel les moyens de correction comprennent des moyens de synchronisation pour ajuster le moment de la libération d'encre par les moyens d'application d'encre.
3. Appareil selon la revendication 2, dans lequel les moyens de synchronisation sont aménagés pour avancer le moment de la libération d'encre lorsque les moyens d'application d'encre se trouvent à proximité d'une pente descendante d'une cavité et pour retarder le moment de la libération d'encre lorsque les moyens d'application d'encre se trouvent proches d'une pente ascendante d'une cavité.
4. Appareil selon les revendications 2 ou 3, dans lequel les moyens d'application d'encre sont aménagés pour se déplacer à vitesse uniforme par-dessus la plaque de transport.
5. Appareil selon l'une quelconque des revendications précédentes, dans lequel les moyens de correction comprennent des moyens d'ajustement de vitesse pour ajuster la vitesse relative entre les moyens d'application d'encre et la plaque de transport.
6. Appareil selon la revendication 5, dans lequel les moyens d'ajustement de vitesse sont aménagés pour réduire la vitesse relative lorsque les moyens d'application d'encre sont proches d'une pente descendante d'une cavité et pour augmenter la vitesse relative lorsque les moyens d'application d'encre sont proches d'une pente ascendante d'une cavité.
7. Appareil selon les revendications 5 ou 6, dans lequel les moyens d'ajustement de vitesse comprennent des moyens de translation pour déplacer la plaque de transport dans une direction sensiblement parallèle à la direction de la bande de matériau récepteur.
8. Appareil selon la revendication 7, dans lequel les moyens de translation sont aménagés pour un mouvement alternatif de la plaque de transport.
9. Appareil selon les revendications 5, 6, 7 ou 8, dans lequel les moyens d'ajustement de vitesse comprennent des moyens pour ajuster la vitesse des moyens d'application d'encre.

10. Appareil selon l'une quelconque des revendications précédentes, dans lequel les moyens de correction comprennent des moyens d'ajustement pour ajuster la distance entre les moyens d'application d'encre et la plaque de transport. 5
11. Appareil selon la revendication 10, dans lequel les moyens d'ajustement comprennent des premiers moyens de déplacement pour déplacer la plaque de transport dans un sens permettant d'ajuster la distance comprise entre les moyens d'application d'encre et la plaque de transport. 10
12. Appareil selon les revendications 10 ou 11, dans lequel les moyens d'ajustement comprennent des seconds moyens de déplacement pour déplacer les moyens d'application d'encre dans un sens permettant d'ajuster la distance entre les moyens d'application d'encre et la plaque de transport. 15
13. Appareil selon l'une quelconque des revendications précédentes, dans lequel les moyens de correction peuvent être commandés par un signal électronique ondulatoire, dans lequel les bords d'attaque et de fuite du signal ondulatoire correspondent aux pentes descendantes et ascendantes des cavités. 20 25
14. Appareil selon l'une quelconque des revendications précédentes, dans lequel l'appareil comprend en outre des moyens de commande pour commander les moyens de correction en fonction d'au moins l'une des caractéristiques choisies dans le groupe comprenant : les caractéristiques du matériau récepteur, les caractéristiques de l'encre, les caractéristiques des images d'encre, le mode d'impression, les caractéristiques de la plaque de transport, la distance entre les moyens d'application d'encre et la plaque de transport et la vitesse des moyens d'application d'encre par rapport à la plaque de transport. 30 35 40
15. Appareil selon la revendication 14, dans lequel les caractéristiques du matériau récepteur comprennent au moins l'une des caractéristiques choisies dans le groupe comprenant : la qualité, le type, l'épaisseur, la teneur en humidité, le poids ou la substance par unité de surface et le formatage. 45
16. Appareil selon la revendication 14, dans lequel les caractéristiques de l'encre comprennent au moins l'une des caractéristiques choisies dans le groupe comprenant : la viscosité et les caractéristiques de moulage de l'encre. 50
17. Appareil selon la revendication 14, dans lequel les caractéristiques des images d'encre comprennent au moins l'une des caractéristiques choisies dans le groupe comprenant : la fraction de surface couverte par l'encre et la densité des pixels. 55
18. Appareil selon la revendication 14, dans lequel le mode d'impression comprend au moins un mode choisi dans le groupe comprenant : le dernier mode, le mode normal et le meilleur mode.
19. Appareil selon la revendication 14, dans lequel les caractéristiques de la plaque de transport comprennent au moins l'une des caractéristiques choisies dans le groupe comprenant : la configuration et/ou le profil des cavités ainsi que la grandeur de la dépression générée par les moyens à vide.
20. Appareil selon la revendication 19, dans lequel l'appareil comprend en outre des moyens de détection pour détecter les positions des cavités par rapport au trajet des moyens d'application d'encre.
21. Appareil selon l'une quelconque des revendications 14 à 20, dans lequel les moyens de commande comprennent des moyens de saisie pour saisir ladite au moins une caractéristique.
22. Procédé d'application d'une image d'encre à un matériau récepteur (3) en utilisant un appareil qui est à même de faire avancer le matériau récepteur (3) dans un sens d'avancement, dans lequel le procédé comprend les étapes consistant à :
- placer une bande de matériau récepteur (3) sur un moyen de transport dans une position prédéterminée par rapport à un moyen d'application d'encre (6), ledit moyen de transport comprenant une plaque de transport (5) pour acheminer ladite bande, ladite plaque de transport (5) ayant des cavités (9) et ladite plaque de transport (5) étant pourvue de trous (12), maintenir la bande de matériau récepteur (3) sur les moyens de transport en aspirant via lesdits trous (12) l'air de l'espace compris entre la plaque de transport (5) et la bande de matériau récepteur (3) se trouvant sur la plaque de transport (5) en utilisant des moyens à vide (14), appliquer une image d'encre à une bande de matériau récepteur (3) en utilisant un moyen d'application d'encre (6), laquelle bande s'étend dans une direction transversale à la direction d'avancement du matériau récepteur (3), **caractérisé par :**
- la correction des variations locales de la distance comprise entre le matériau récepteur (3) et les moyens d'application d'encre (6) en utilisant des moyens de correction.
23. Procédé selon la revendication 22, dans lequel les moyens de correction sont ceux compris dans l'appareil selon l'une quelconque des revendications 1 à 21.

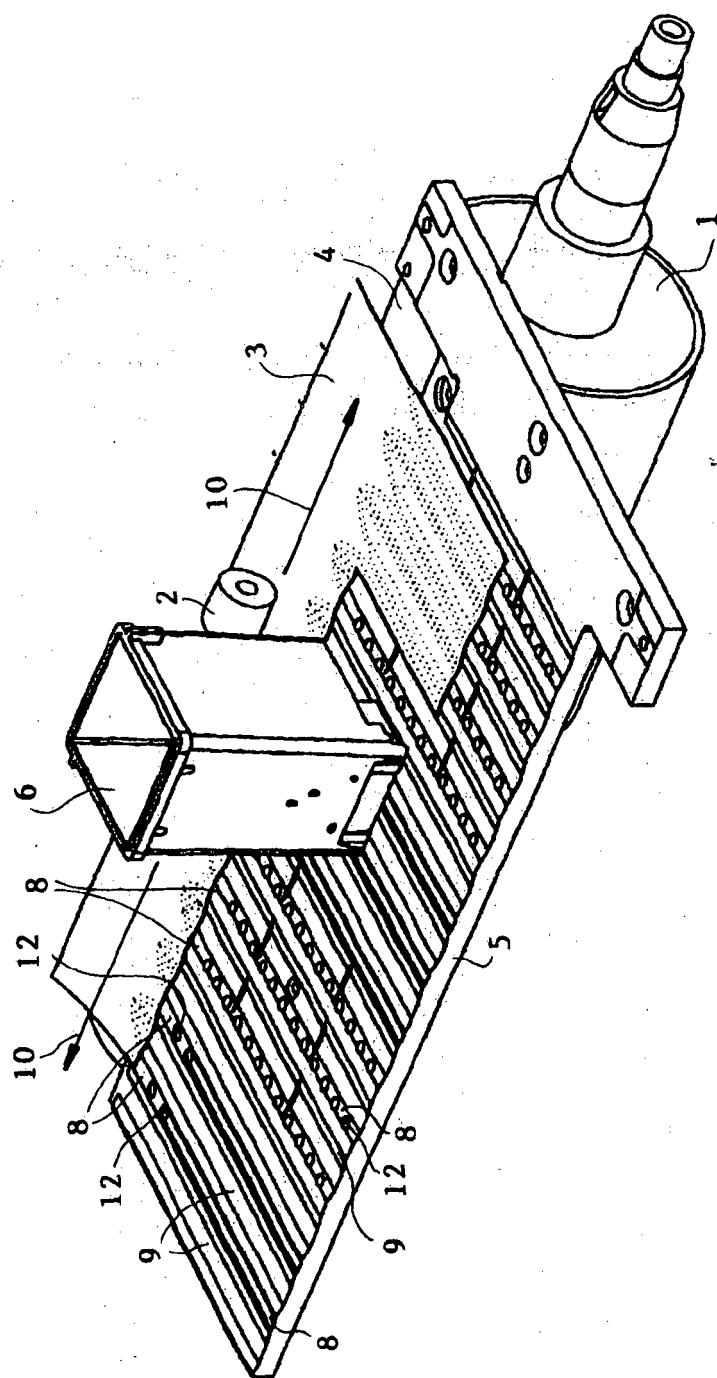
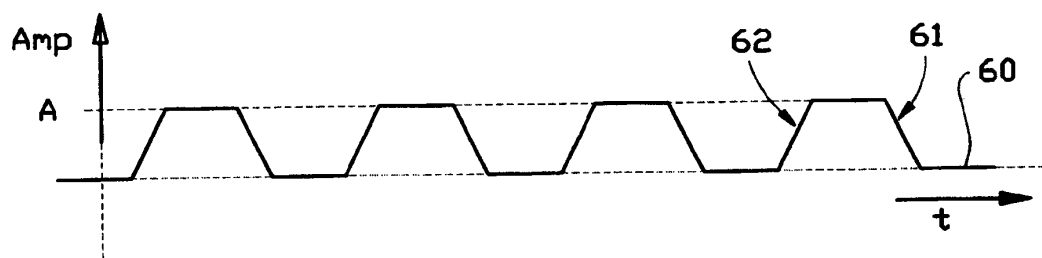
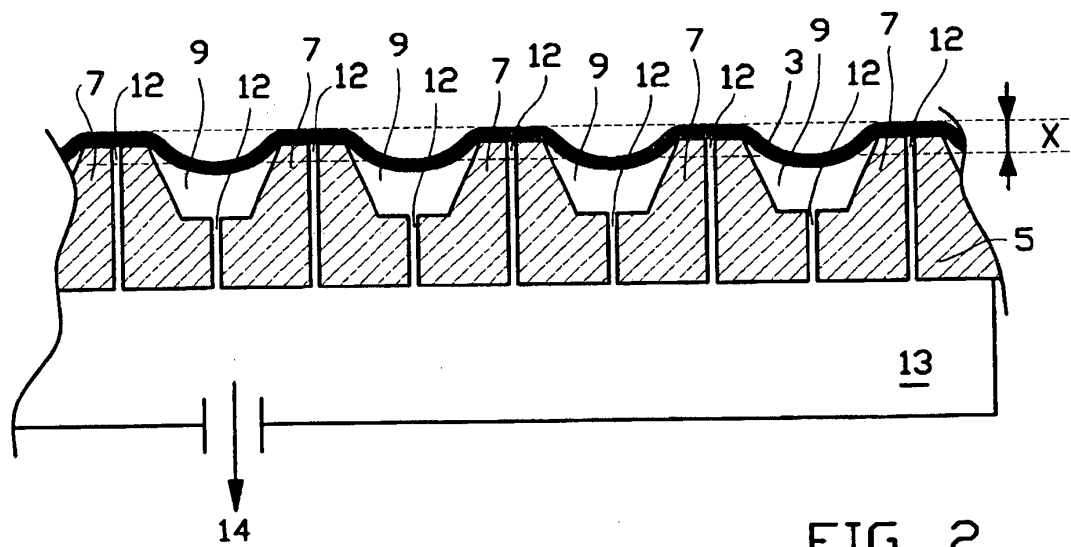


FIG.1



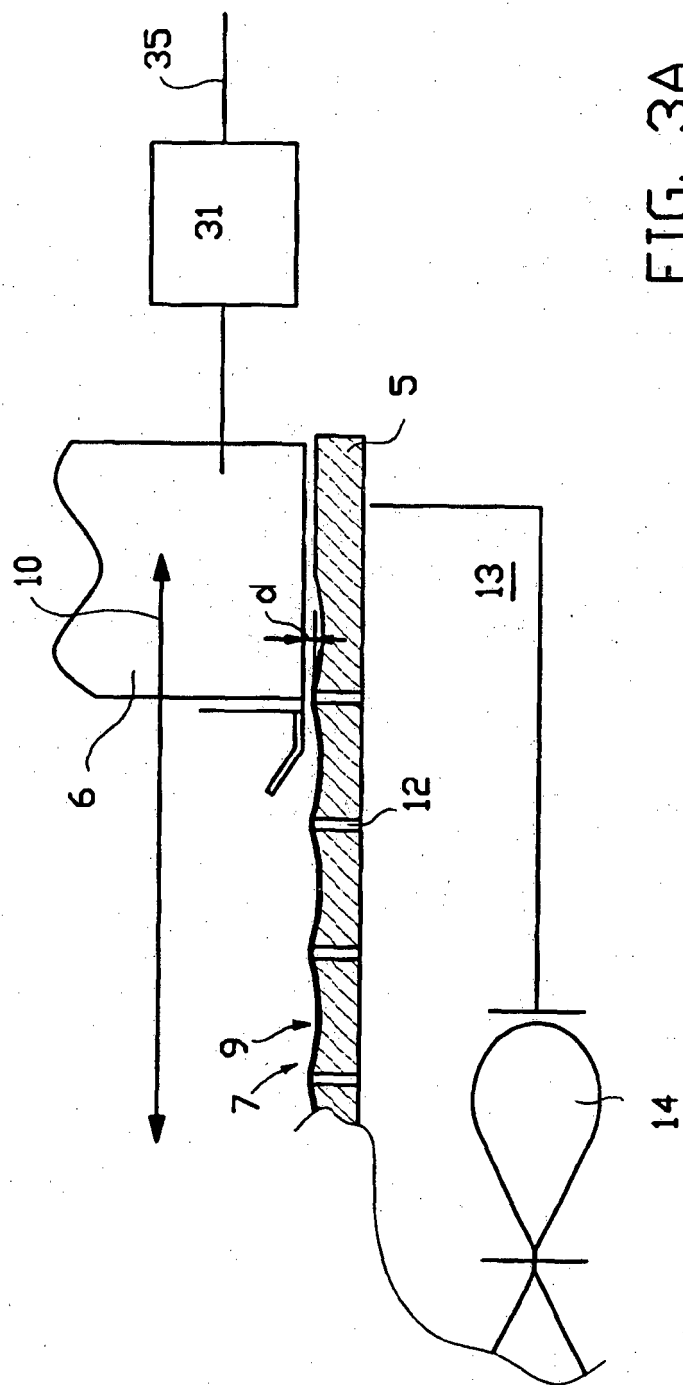


FIG. 3A

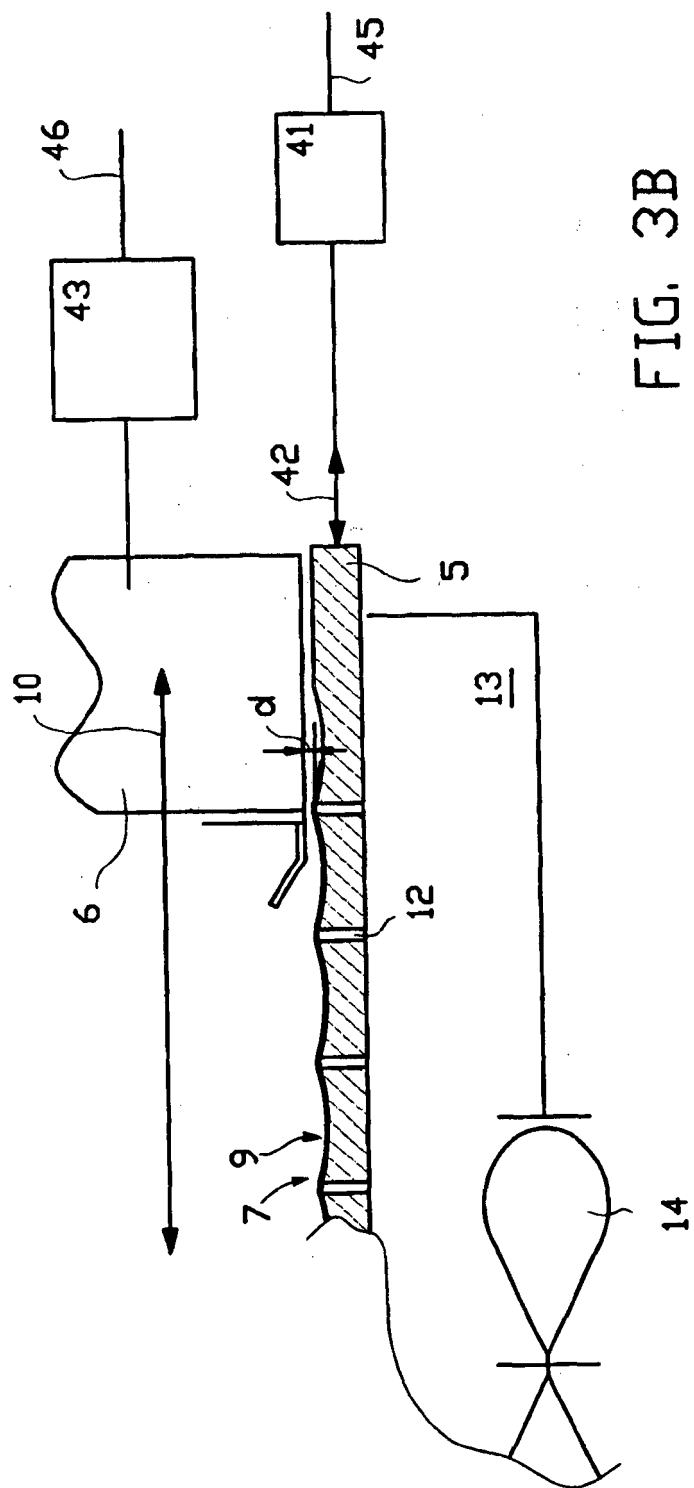


FIG. 3B

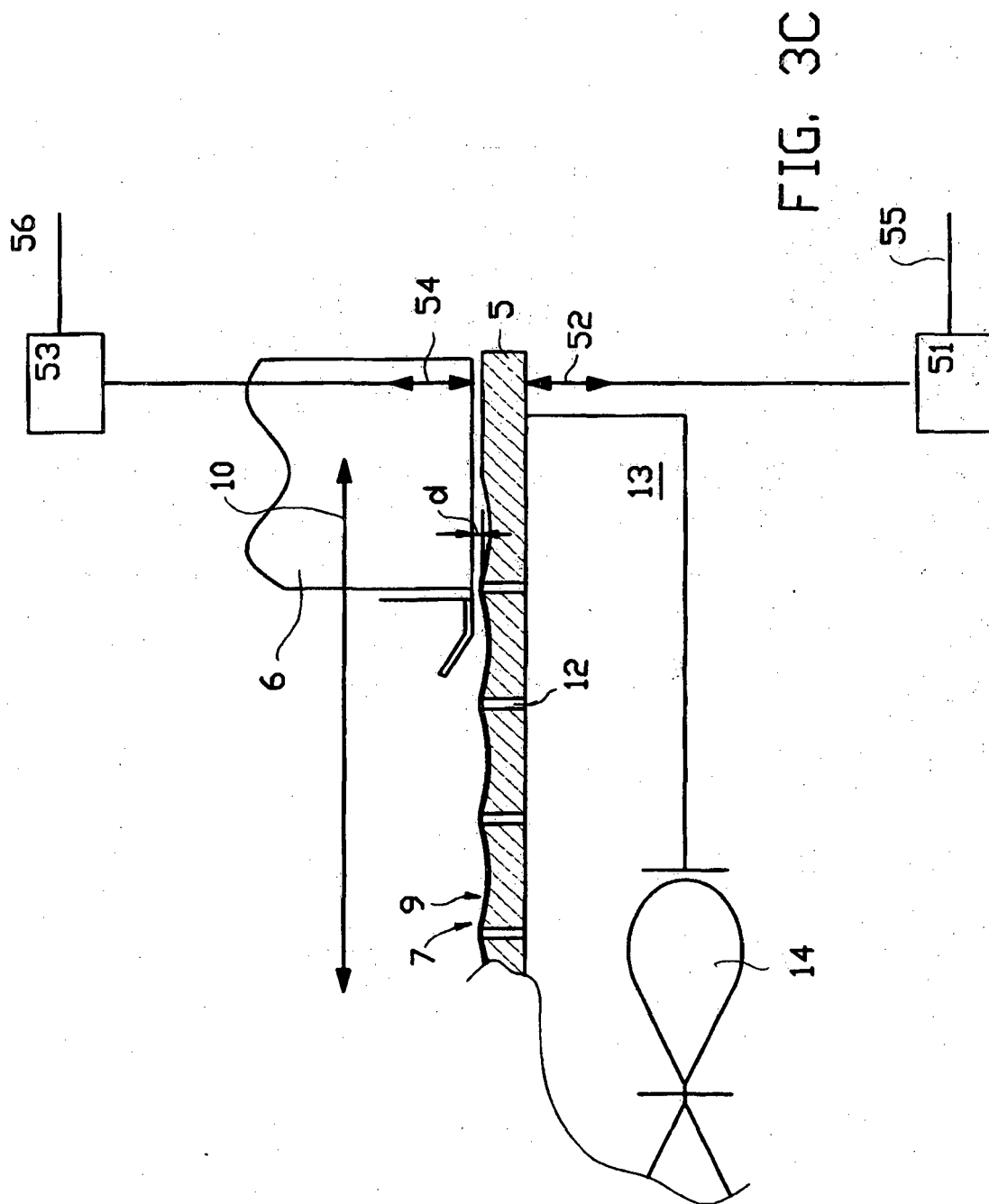


FIG. 3C

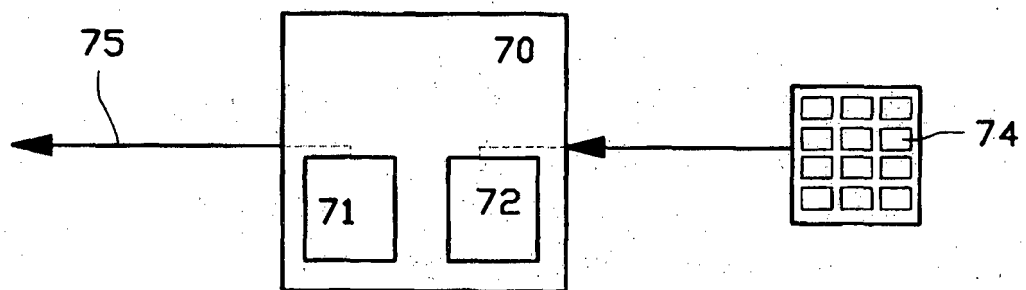


FIG. 5

REFERENCES CITED IN THE DESCRIPTION

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