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(54) **Matrix printer and method for printing by means of a matrix printer.**

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(73) Proprietor : **FACIT AKTIEBOLAG**
S-172 91 Sundbyberg (SE)

(72) Inventor : **Gustafsson, Lars Gunnar Björkudden**
S-597 00 Atvidaberg (SE)

(74) Representative : **Onn, Thorsten et al**
AB STOCKHOLMS PATENTBYRA Box 3129
S-103 62 Stockholm (SE)

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Description

Technical Field

This invention is concerned with the technical field of matrix printers and printing by means of matrix printers. More specifically, the invention relates to methods and matrix printers for printing with different combinations of printing rate and quality of the print. The invention also relates to methods and matrix printers for printing in lines of either one or two lines at the same time. Moreover, the invention relates to methods and matrix printers for printing in lines with either a type height extending over only one line or a type height that may extend over two lines.

State or Art

In matrix printers having needles or corresponding printing elements with movable parts desiderata as to a high printing rate, a high quality and size of the transcript will mean at least partly conflicting demands on the number of printing elements and their orientation and position relative to one another. Therefore matrix printers are usually embodied so that printing can be made with at least two optional combinations of printing rate and quality. A combination means that printing can be carried out at a comparatively high rate and a comparatively low quality. Another combination means that printing can take place at a comparatively low rate and a comparatively high quality.

It is previously known from DE-C2-26 32 293 to arrange printing elements in two parallel element rows in a printing head of a matrix printer. For printing by means of the printing elements on a record support the printing head is movable relative to the record support and turnable to two different predetermined angular positions relative to the direction of motion. One angular position is used when printing at a comparatively high rate and a comparatively low quality of the print. The other angular position is used when printing at a comparatively low rate and a comparatively high quality of the print. When printing substantially simultaneously by means of the printing elements in both element rows print from the printing elements in one element row will be substantially interfoliated in the direction of motion with or overlapped by print from the printing elements in the other element row no matter which of the angular positions is used.

It is previously known from DE-A1-32 08 104 to have a plurality of printing elements arranged in more than two parallel element rows in the printing head of a matrix printer, for example four or six element rows with six printing elements in each element row. In connection with printing in a certain printing direction on a paper or another record support the printing head is turnable to two different predetermined angular positions relative to the printing direction. For printing at a high rate but low quality the printing head is turned to one of the predetermined angular positions. For printing at a low rate but high quality the printing head is turned to another of the predetermined angular positions. The angular positions and the mutual positions of the printing elements are such that a print from the printing elements in an arbitrary element row will be substantially interfoliated with or overlapped by print from the printing elements in the other element rows.

It is previously known from the published Japanese application JP 60-72746 to print characters of a different size in lines on a record support by means of a matrix printer by turning the printing head to different angular positions relative to the direction of the line and to adapt at the same time the moving rate of the printing head in the direction of the line to the turning.

Summary of the Invention

In matrix printers having needles or corresponding printing elements with movable parts the rate at which a separate needle or the movable parts of a printing element can be moved will usually be a limiting factor for the printing rate at a definite number and definite positions of the printing elements. Moreover, at a definite printing rate the number of needles or printing elements and their mutual positions and orientation relative to the printing direction will be a limiting factor for the quality and size of the print. The number of needles or printing elements and their mutual positions and orientation in printing at different printing rate and quality are also of importance to the cost complexity and cost of a matrix printer. The methods according to which printing can be carried out at different rate and quality are also of importance to the cost and complexity, not the least of the software.

It is the object of the invention to create a matrix printer and a method which provide in a comparatively simple and inexpensive way great variation posibilities in respect of quality and size of the print, different spacing, lowered and raised text etc. maintaining as high a printing rate as possible.

What characterizes a method and matrix printer according to the invention and especially preferred embodiments thereof are apparent from the claims. Somewhat simplified it can be said that a matrix printer according to the invention has certain similarities to known matrix printers. A matrix printer according to the invention has a printing head with a plurality of printing elements arranged in two parallel element rows. When printing by means of the printing elements on a record support the element rows can be turned to different predetermined angular positions and can be moved parallelly to the record support maintaining the predetermined angular positions.

A matrix printer according to the invention and especially preferred embodiments thereof differ from

known matrix printers through special angular positions, distances between the element rows, positions of the printing elements in the element rows relative to one another, different numbers of printing elements in different element rows etc., preferably in certain combinations with each other.

A method according to the invention has certain similarities to known printing methods. The method utilizes a matrix printer having a printing head with a plurality of printing elements arranged in two parallel element rows. In connection with printing the element rows are turnable and can be moved parallelly to a record support maintaining predetermined angular positions relative to the direction of parallel motion. In the method a first of the predetermined angular positions is used to print a print by means of the printing elements in one element row which print at least substantially overlaps or is interfoliated with print from the printing elements in the other element row.

A method according to the invention and especially preferred embodiments thereof differ from known methods primarily through the difference between a second predetermined angular position and the first predetermined angular position and how the printing elements in the two element rows are utilized in connection with printing in the second angular position.

In a method and a matrix printer according to the invention the second predetermined angular position is such that at simultaneous printing with the printing elements in both the element rows the printing elements in one element row can be utilized for printing a print which in the direction of parallel motion is substantially neither interfoliated with nor overlaps a print from the printing elements in the other element row.

To embody a matrix printer and a method for printing by means of a matrix printer according to the invention involves important advantages. A first predetermined turning position can be utilized when printing in lines for printing at a comparatively low rate and a comparatively high quality. A second predetermined turning position can be utilized for printing at a comparatively high rate and a comparatively low quality. This is previously known per se. However, the second predetermined angular position can moreover be utilized when printing in lines for either simultaneous printing of normally big characters in two separate lines or printing of extra big characters extending over two lines.

At a certain distance between the element rows relative to the distance between the printing elements in one element row and angular positions forming a clockwise and anti-clockwise angle of about 45° to the direction of motion of the element rows the hardware and the software required to activate the separate printing elements can be made particularly simple and cheap. With more printing elements in one element row than in the second element row and a certain displacement of the printing elements in one element row relative to the printing elements in the other element row printing with different line spacing, printing of lowered or raised characters, underlining etc. can moreover be carried out in a particularly simple and rapid way.

Further advantages of a method and a matrix printer according to the invention will be appreciated by one skilled in the art after studying the following description with preferred embodiments.

Brief Description of Drawings

Fig. 1 illustrates in a much simplified form a plurality of printing elements arranged in two parallel element rows which are moved in printing parallelly to a record support maintaining a first predetermined turning position relative to the direction of parallel motion.

Fig. 2 illustrates in a much simplified form a plurality of printing elements arranged in two parallel element rows which are moved in printing relative to a record support maintaining a second predetermined turning position relative to the direction of parallel motion.

Fig. 3 illustrates printing in lines of characters with the element rows in a first predetermined angular position.

Fig. 4 illustrates printing in lines of characters with the element rows in a second predetermined angular position differing 90° from the angular position in Fig. 3.

Preferred embodiments

Fig. 1 illustrates in a much simplified form a printing head 1 of a matrix printer. For printing on a paper or another record support 2 the printing head has a plurality of needles or corresponding printing elements of another kind. The needles or the printing elements 3, 4, 5, 6, 7, 8, 9, 10 and 11 are equally spaced in a first needle bank or element row 12. The needles or printing elements 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 and 24 are equally spaced in a second needle bank or element row 25. The needles or printing elements are mutually similar and the needle banks or element rows are parallel, i.e. a line through the centre of the needles or printing elements 3-11 is parallel to a line through the centre of the needles or printing elements 13-24. The distance between a line through the centre of the printing elements 3-11 in the first element row 12 and a line through the centre of the printing elements 13-24 in the second element row 25 is about as great as the centre distance between the printing elements 3 and 9 or the centre distance between the printing elements 13 and 19. This can also be expressed so that the distance between the element rows is several times as great as the centre dis-

tance between two adjacent printing elements in one element row. The distance between the element rows can also be said to be less than the whole distance between the first printing element 3 and the last printing element 11 in the element row 12 and can also be said to be less than the whole distance between the first printing element 13 and the last printing element 24 in the element row 25. As the number of printing elements in the first element row is nine and the number of printing elements in the second element row is twelve the distance between the element rows will also be greater than half the distance between the printing elements 3 and 11 but approximately as great as half the distance between the printing elements 13 and 24. If the number of printing elements in the element row 25 had been less, e.g. eleven, the distance between the element rows should also have been considerably larger than half the distance between the first and the last printing element in the element row 25.

The first printing element 3 in the first element row 12 is not located right opposite the first printing element 13 in the second element row 25 but about right opposite the printing element 19 or 20. Nor is the last printing element 24 in the second element row 25 located right opposite the last printing element 11 in the first element row 12 but about right opposite the printing element 7 or 8. Moreover, the midway printing element 7 in the first element row 12 is not located right opposite any one of the two midway printing elements 18 or 19 in the second element row 25 but about right opposite the printing elements 23 or 24. Therefore the printing elements 3-11 in one element row 12 can be said to be displaced a distance in the common direction of the element rows relative to the printing elements 13-24 in the second element row. Depending on whether the displacement is measured between the first, the midway or the last printing elements in the element rows the displacement will be different as there are more printing elements in the element row 25 than in the element row 12. However, no matter where the displacement is measured it will be at least three times as great as the centre distance between adjacent printing elements in an element row. Is the displacement measured between the first printing elements in the respective element row it will be about six times as great as the centre distance between adjacent printing elements in an element row.

The matrix printer has means for activating individually at selected times the separate printing elements to generate separate printing dots on the record support, the positions of the separate printing points on the record support and relative to one another depending on the position and orientation of the element rows relative to the record support. At a certain moment when the printing head is in a position and has an orientation relative to the record support according to Fig. 1 printing dots having a size and positions in accordance with one or more of the size and position of the printing elements in Fig. 1 can be printed on the record support.

In order to change the orientation of the element rows relative to the record support the matrix printer has turning means capable of turning the printing head so that the element rows are turned synchronously about a common pivotal centre c. Moreover, the matrix printer has moving means to move the printing head so that the element rows can be moved with maintained orientation parallelly to the record support in a first direction of parallel motion parallel to the arrow H in Fig. 1 and in an opposite direction. This direction of parallel motion is sometimes called horizontal direction or line direction at printing in lines on the record support. The matrix printer has also means for moving the record support relative to the printing head in a second moving direction in parallel with the arrow V in Fig. 1 or in an opposite direction, maintaining the orientation of the element rows. This moving direction is sometimes called vertical direction.

Different kinds of needles and other printing elements in a printing head of matrix printers as well as means for activating the printing elements are well-known to one skilled in the art. Means for moving in lines of printing head in matrix printers and for moving of paper and other record supports relative to printing head perpendicularly to the direction of the line are also well-known to one skilled in the art. Means for turning a printing head are also known. Therefore it will not be necessary to describe such means here. For the sake of clearness these means are not illustrated in the figures, either.

In Fig. 1 the printing head with the element rows enters a first predetermined turning position relative to the directions of motion. Each of the element rows forms an anti-clockwise angle of 45° to the direction H of parallel motion, also called the line direction or printing direction in printing of lines along parallel lines 26. When printing with the printing elements in both element rows oriented according to Fig. 1 and movement of the element rows in the direction of the arrow H or in an opposite direction a print consisting of printing dots from the printing elements 3-11 in the element row 12 in the direction of the arrow H will be interfoliated with or overlapped by a print consisting of printing dots from the printing elements 13-22 in the element row 25. As the element row 25 has three more printing elements than the element row 12 this print consisting of printing dots from the printing elements in the element row 25 will however only be partly overlapped by or interfoliated with print consisting of printing dots from the printing elements 3-11 in the element row 12. Therefore a print consisting of printing dots from the printing elements 23 and 24 will not be interfoliated with or overlapped by print from any printing element in the element row 12.

In Fig. 2 the printing head with the element rows

enters a second predetermined turning position relative to the directions of motion. Each of the element rows forms a clockwise angle of 45° to the direction H of parallel motion. When printing with the printing elements in both element rows oriented according to Fig. 2 and displacement of the element rows in the direction of the arrow H or in the opposite direction a print consisting of the printing dots from the printing elements 3-11 in the element row 12 in the direction of the arrow H will be neither interfoliated with nor overlapped by print consisting of printing dots from the printing elements 13-24 in the element row 25. Of course a print consisting of printing dots from the printing elements 13-24 in the element row 25 will be neither interfoliated with nor overlapped by print consisting of printing dots from the printing elements 3-11 in the element row 12. The reason for this is that all the printing elements in one element row in Fig. 2 is on one side of the fulcrum C as seen in the direction of the arrow V while all the printing elements in the second element row in Fig. 2 are on the other side of the fulcrum C as seen in the direction of the arrow V. With the printing elements and the element rows oriented relative to the record support according to Fig. 2 the element rows must be moved at least a little in the direction of the arrow V in connection with printing in order that a print from the printing elements of the different element rows might be more or less interfoliated or overlap each other.

In Fig. 3 L3, L4, L5, L6, L7, L8, L9, L10, L11, L13, L14, L15, L16, L17, L18, L19, L20, L21, L22, L23 and L24 illustrate the lines along which the printing elements 3-11 and 13-24 can print printing dots when the element rows are moved parallelly in the direction of the arrow H maintaining the first predetermined turning position according to Fig. 1. It is apparent from Fig. 3 that the line L3 is straight between the lines L13 and L14, that the line L14 is straight between the lines L3 and L4, that the line L4 is straight between the lines L14 and L15, that the line L15 is straight between the lines L4 and L5 etc. Thus, the line L11 is straight between the lines L21 and L22. When the element rows are in the first predetermined turning position according to Fig. 1 the lines L3-L11 are interfoliated with the lines L13-L22. With the element rows in the first predetermined turning position the printing elements of both the element rows can be used during one single movement in the direction of the arrow H to print with printing dots overlapping each other in the direction of the arrow H as well as in the direction of the arrow V. A print of a comparatively high quality can be printed in this way along a line during only one movement in the direction of the arrow H or during only one movement in a direction contrary to the arrow H. Printing dots from printing elements in one single row can then overlap each other in the direction of the line or in the direction of the arrow H but not in the direction of the arrow V or the vertical direction. As an example of a print having a comparatively high quality that can be printed in this way with the element rows in the first predetermined turning position the letter N built of a number of circular dots is illustrated.

In Fig. 4 the lines L3, L4, ..., L11, L13, L14, ..., L23 and L24 illustrate the lines along which the printing elements 3-11 and 13-24 can print printing dots when the element rows are moved parallelly in the direction of the arrow H maintaining the second predetermined turning position according to Fig. 2 relative to the record support. It will appear from the figure that the distance between two arbitrary adjacent lines of L3 - L24 is as great. Thus, the distance between the lines L24 and L3 is as great as the distance between the lines L23 and L24 and as great as the distance between the lines L3 and L4. Thus, the lines L3 - L11 and L13 - L24 form together a line screen of a regular spacing. Thanks to this regular line screen consisting of 21 lines when the element rows are oriented in the second predetermined angular position according to Figs. 2 and 4 the printing elements can be utilized in printing in different ways illustrated by means of the five letters P in Fig. 4. One way of printing with the printing elements in the second predetermined angular position is to print one character line, when printing in lines, by means of only the printing elements 3-11 in one element row 12 and substantially simultaneously to print another character line by means of only the printing elements 13-24 in the second character line. Lowered characters can be printed by means of the printing elements 22-24 or the line distance between adjacent character lines can be changed. Another way of printing with the element rows in the second predetermined angular position is to print extra big characters having a height extending over two lines by means of printing elements in both the element rows. Either merely big characters or alternately small characters extending over only one line and big characters extending over two lines can be printed. If small characters are printed the printing rate can be high as two lines of characters can be printed during one single movement of the element rows in the direction of the arrow H or in the opposite direction. The quality of the print will then be comparatively low.

It is well-known to one skilled in the art that in matrix printers having printing elements in one element row not perpendicular to the printing direction the angle between the element row and the printing direction must be considered when the separate printing elements are activated. In order to print for instance a number of dots in a line perpendicular to the printing direction the printing elements must be activated to each print their printing dot at different times when the element row is in different positions in the printing direction. It may be necessary to delay signals from a character generator successively before they are added to the activating means of the separate printing

elements. The more the angle between the element row and the printing direction deviates from 90°, the more the signals to adjacent printing elements need be delayed relative to one another. In a method and a matrix printer according to Figs. 1-4 the angle between the element rows and the printing direction is as great in both the predetermined turning positions. Therefore the signals to adjacent printing elements in one element row must be delayed as much relative to one another in both the turning positions in order to print for instance one line of dots perpendicular to the printing direction. This involves essential advantages when designing the delay means and the embodiment of the printing method.

Of course the invention is not limited to the embodiments described above in connection with Figs. 1-4 but it is possible to modify a method and a matrix printer within the scope of the claims. For instance, it is not absolutely necessary to have a different number of printing elements in the element rows and definitely not necessary to have just nine printing elements in one element row and twelve printing elements in the other element row. The number of printing elements, the spacing within one element row and the distance between the element rows can deviate from those illustrated in Figs. 1-4. It is possible but definitely not to be preferred that both the predetermined turning positions differ somewhat less than 90° from one another.

Claims

1. A method for printing on a record support (2) by means of a matrix printer, said matrix printer having a printing head (1) with a plurality of printing elements (3-11, 13-24) arranged in two parallel element rows (12, 25), said element rows being synchronously turnable in connection with printing and parallelly movable relative to the record support maintaining predetermined angular positions relative to the direction of parallel motion, in which method the element rows are turned synchronously to a first predetermined angular position and the printing elements (3-11) in one element row (12) are utilized to print a print that in the direction (H) of parallel motion is at least substantially interfoliated with or overlaps a print from the printing elements (13-24) in the other element row (25), **characterized** in that the element rows are turned to a second predetermined angular position and the printing elements in one element row are utilized to print a print that in the direction of parallel motion is substantially neither interfoliated with nor overlaps a print from printing elements in the other element row.

2. The method of claim 1, **characterized** in that the element rows are turned to a predetermined angular position where they form a clockwise angle of about 45° to the direction (H) of parallel motion and to another predetermined angular position where the element rows form an anti-clockwise angle of about 45° to the direction (H) of parallel motion.

3. The method of claim 1 in printing of alpha-numerical characters along substantially parallel lines on the record support, **characterized** in that two lines with characters are printed substantially at the same time in that the element rows are turned to the second predetermined angular position and the characters in a line are printed by means of the printing elements in one element row substantially at the same time as the characters in another line are printed by means of the printing elements in the other element row.

4. The method of claim 1 in printing of alpha-numerical characters along substantially parallel lines on the record support, **characterized** in that characters of a great height extending over two adjacent lines are printed in that the element rows are turned to the second predetermined angular position and the printing elements in both the element rows are utilized to print the big characters together while characters of a small height not extending over more than one line are printed by means of the printing elements in either row.

5. A matrix printer having a printing head (1) with a plurality of printing elements (3-11, 13-24) arranged in two parallel element rows (12, 25), said matrix printer comprising displacement means for moving the element rows parallelly relative to a record support (2) in printing by means of the printing elements on said record support, said matrix printer comprising means for turning in printing both the element rows synchronously to predetermined angular positions relative to the direction in which the element rows are parallelly moved relative to the record support, of which angular positions a first predetermined angular position is such that in substantially simultaneous printing by means of the printing elements in both the element rows in this angular position a print from the printing elements (3-11) in one element row (12) will at least substantially overlap or be interfoliated with a print from the printing elements (13, 24) in the other element row (25) in the direction (H) of parallel motion, **characterized** in that the second predetermined angular position is such that at substantially simultaneous printing by means of the printing elements in both the element rows in this angular position a print from the printing elements (3-11) in one element row (12) will neither be interfoliated with or overlap a print from the printing elements (13-24) in the other element row (25) in the direction of parallel motion.

6. A matrix printer according to claim 5, **characterized** in that the element rows in one of the predetermined angular positions form a clockwise angle of about 45° to the direction of parallel motion and that the element rows in another of the predetermined angular positions forms an anti-clockwise angle of about 45° to the parallel motion.

7. A matrix printer according to claim 5, where the

printing elements are equally spaced in the respective element row, **characterized** in that the element rows are arranged at a mutual distance that is several times as great as the spacing in either element row.

8. A matrix printer according to claim 5, **characterized** in that the element rows are mutually spaced with a distance that is greater than half but less than the whole distance between the first (3) and the last printing element (11) in one element row (12).

9. A matrix printer according to claim 5, **characterized** in that the printing elements in one element row are displaced a distance in the common direction of the element rows relative to the printing elements in the other element row which is greater than half but less than the whole distance between the first (3) and the last printing element (11) in one element row (12).

10. A matrix printer according to claim 5,**characterized** in that the number of printing elements in one element row (25) is higher than the number of printing elements in the other element row (12).

11. A matrix printer according to claim 5, **characterized** in that the number of printing elements in one element row (25) is twelve and the number of printing elements in the other element row (12) is nine.

Patentansprüche

1. Verfahren zum Bedrucken eines Aufzeichnungsträgers (2) durch einen Matrix-Drucker, wobei der Matrix-Drucker einen Druckkopf (1) mit einer Vielzahl von Druckelementen (3 - 11, 13 - 24) aufweist, die in zwei parallelen Druckelementenreihen (12, 25) angeordnet sind, wobei die Druckelementenreihen beim Drucken synchron drehbar un d bezüglich des Aufzeichnungsträgers parallel bewegbar sind, wobei sie bezüglich der Richtung der Parallelbewegung vorbestimmte Winkelstellungen fest einnehmen, wobei weiterhin die Druckelementenreihen zu einer ersten vorbestimmten Winkelstellung synchron gedreht werden und die Druckelemente (3 - 11) in einer Druckelementenreihe (12) dazu benutzt werden, ein Zeichen zu drucken, das in der parallelen Bewegungsrichtung (H) einen Platz zwischen wenigstens einem Zeichen der Druckelemente (13 - 24) der anderen Druckelementenreihe (25) im wesentlichen ausfüllt oder das Zeichen überlappt, **dadurch gekennzeichnet**, daß die Druckelementenreihen in eine zweite vorbestimmte Winkelstellung gedreht werden und die Druckelemente in einer Druckelementenreihe benutzt werden, ein Zeichen zu drucken, das in der parallelen Bewegungsrichtung einen Platz zwischen einem Zeichen der Druckelemente der anderen Druckelementenreihe weder ausfüllt noch ein Zeichen überlappt.

2. Verfahren nach Anspruch 1, **dadurch gekennzeichnet**, daß die Druckelementenreihen in eine vorbestimmte Winkelstellung gedreht werden, wo sie eine Winkellage von 45° im Uhrzeigersinn gegenüber der Richtung (H) der parallelen Bewegung einnehmen und daß die Druckelementenreihen in eine andere vorbestimmte Winkelstellung gedreht werden, wo die Elementenreihen eine Winkellage von 45° gegen den Uhrzeigersinn gegenüber der Richtung (H) der parallelen Bewegung einnehmen.

3. Verfahren nach Anspruch 1 zum Drucken von alphanumerischen Zeichen entlang im wesentlichen paralleler Zeilen auf einem Aufzeichnungsträger, **dadurch gekennzeichnet**, daß zwei Zeilen im wesentlichen zur selben Zeit mit Zeichen bedruckt werden, wobei die Druckelementenreihen in die zweite vorbestimmte Winkelstellung gedreht werden und die Zeichen einer Zeile durch die in einer Druckelementenreihe angeordneten Druckelemente im wesentlichen zur selben Zeit gedruckt werden wie die Zeichen einer anderen Zeile durch in der anderen Druckelementenreihe befindlichen Druckelemente.

4. Verfahren nach Anspruch 1 zum Drucken von alphanumerischen Zeichen entlang im wesentlichen paralleler Zeilen auf einem Aufzeichnungsträger, **dadurch gekennzeichnet**, daß hohe Zeichen, die zwei benachbarte Zeilen überragen, derart gedruckt werden, daß die Druckelementenreihen in die zweite vorbestimmte Winkelposition gedreht werden und die Druckelemente in beiden Druckelementenreihen dazu benutzt werden, große Zeichen gleichzeitig zu drucken, während kleine Zeichen, die nicht mehr als eine Zeile überragen, durch die in jeder Reihe befindlichen Druckelemente gedruckt werden.

5. Matrix-Drucker mit einem Druckkopf (1) mit einer Vielzahl von Druckelementen (3 - 11, 13 - 24), die in zwei parallelen Reihen (12, 25) angeordnet sind, wobei der Matrix-Drucker Antriebsmittel aufweist, um die Druckelementenreihen parallel zum Aufzeichnungsträger (2) zu bewegen und um den Aufzeichnungsträger durch die Druckelemente zu bedrucken, wobei der Matrix-Drucker Mittel aufweist, um beide Druckelementenreihen synchron in vorbestimmte Winkelstellungen gegenüber der Richtung zu drehen, in welcher die Elementenreihen parallel bewegt werden gegenüber dem Aufzeichnungsträger, in welchen Winkelstellungen eine erste vorbestimmte Winkelposition so ist, daß beim im wesentlichen simultanen Drucken durch die Druckelemente in beiden Elementenreihen in dieser Winkelstellung ein Druck von den Druckelementen (3 -11) in einer Elementenreihe (12) wenigstens wesentlich überlappt oder dazwischen ausgefüllt wird mit einem Druck der Druckelemente (13, 24) in der anderen Elementenreihe (25) in Richtung (H) der parallelen Bewegung, **dadurch gekennzeichnet**, daß die zweite vorbestimmte Winkelstellung eine solche ist, daß sie bei im wesentlichen simultanen Drucken durch die Druckelemente in beiden Elementenreihen in dieser Winkelstellung einen Druck der Druckelemente (3 - 11) in einer Elementenreihe (12) weder dazwischen ausfüllt noch einen Druck der Druckele-

mente (13-24) in der anderen Elementenreihe (25) in Richtung der parallelen Bewegung überlappt.

6. Matrix-Drucker nach Anspruch 5, **dadurch gekennzeichnet**, daß die Druckelementenreihen in einer der vorbestimmten Winkelstellungen eine Winkellage im Uhrzeigersinn von etwa 45° gegenüber der parallelen Bewegungsrichtung einnimmt und daß die Druckelementenreihen in einer anderen der vorbestimmten Winkellagen einen Winkel gegen den Uhrzeigersinn von etwa 45° bezüglich der parallelen Bewegung einnehmen.

7. Matrix-Drucker nach Anspruch 5, wobei die Druckelemente in der betreffenden Elementenreihe beabstandet voneinander angeordnet sind, **dadurch gekennzeichnet**, daß die Elementenreihen in einem gegenseitigen Abstand angeordnet sind, der mehrmals so groß als der Abstand in jeder Elementenreihe ist.

8. Matrix-Drucker nach Anspruch 5, **dadurch gekennzeichnet**, daß die Elementenreihen mit einem Abstand voneinander angeordnet sind, der größer als die Hälfte aber weniger als der ganze Abstand zwischen dem ersten (3) und dem letzten Druckelement (11) einer Druckelementenreihe (12) ist.

9. Matrix-Drucker nach Anspruch 5, **dadurch gekennzeichnet**, daß die Druckelemente in einer Elementenreihe in einem Abstand in der gemeinsamen Richtung der Elementenreihen bezüglich der Druckelemente in der anderen Elementenreihe angeordnet sind, der größer als die Hälfte aber weniger als die ganze Entfernung zwischen dem ersten (3) und dem letzten Druckelement (11) einer Elementenreihe ist.

10. Matrix-Drucker nach Anspruch 5, **dadurch gekennzeichnet**, daß die Anzahl der Druckelemente einer Elementenreihe (25) größer ist als die Anzahl der Druckelemente in der anderen Elementenreihe (12).

11. Matrix-Drucker nach Anspruch 5, **dadurch gekennzeichnet**, daß die Anzahl der Druckelemente einer Elementenreihe (25) zwölf ist und die Anzahl der Druckelemente in der anderen Elementenreihe (12) neun ist.

Revendications

1. Procédé pour l'impression sur un support d'enregistrement (2) au moyen d'une imprimante en mosaïque ou par points, cette imprimante en mosaïque ayant une tête d'impression (1) avec plusieurs éléments d'impression (3-11, 13-24) disposés en deux rangées d'éléments parallèles (12, 25) que l'on peut faire tourner de façon synchrone en liaison avec l'impression et mobiles parallèlement par rapport au support d'enregistrement maintenant des positions angulaires prédéterminées par rapport à la direction du mouvement parallèle, procédé dans lequel on fait tourner les rangées d'éléments de façon synchrone sur une première position angulaire prédéterminée et les éléments d'impression (3-11) dans une rangée d'éléments (12) sont utilisés pour réaliser une impression qui dans la direction (H) du mouvement parallèle est au moins sensiblement interfoliée avec ou chevauche une impression par les éléments d'impression (13-24) dans l'autre rangée d'éléments (25), caractérisé en ce que les rangées d'éléments sont tournées sur une seconde position angulaire prédéterminée et les éléments d'impression dans une rangée d'éléments servent à réaliser une impression qui dans la direction du mouvement parallèle n'est sensiblement ni interfoliée avec ni en chevauchement avec une impression par les éléments d'impression dans l'autre rangée d'éléments.

2. Procédé selon la revendication 1, caractérisé en ce que l'on fait tourner les rangées d'éléments sur une position angulaire prédéterminée où elles forment un angle dans le sens horaire d'environ 45° par rapport à la direction (H) du mouvement parallèle et sur une autre position angulaire prédéterminée où les rangées d'éléments forment un angle anti-horaire d'environ 45° par rapport à la direction (H) du mouvement parallèle.

3. Procédé selon la revendication 1 pour l'impression de caractères alpha-numériques sur des lignes sensiblement parallèles sur le support d'enregistrement, caractérisé en ce que deux lignes avec des caractères sont imprimées sensiblement en même temps, en ce que l'on fait tourner les rangées d'éléments sur la seconde position angulaire prédéterminée et les caractères dans une ligne sont imprimés au moyen des éléments d'impression dans une rangée d'éléments sensiblement en même temps que les caractères dans une autre ligne sont imprimés au moyen des éléments d'impression dans l'autre rangée d'éléments.

4. Procédé selon la revendication 1 pour l'impression de caractères alpha-numériques sur des lignes sensiblement parallèles sur le support d'enregistrement, caractérisé en ce que l'on imprime les caractères de grande hauteur s'étendant sur deux lignes contiguës et en ce que l'on fait tourner les rangées d'éléments sur la seconde position angulaire prédéterminée et les éléments d'impression dans les deux rangées d'éléments sont utilisés pour imprimer ensemble les gros caractères tandis que les caractères de petite taille ne dépassant pas plus d'une ligne sont imprimés au moyen des éléments d'impression dans l'une ou l'autre des rangées.

5. Imprimante en mosaïque ou par points ayant une tête d'impression (1) avec plusieurs éléments d'impression (3-11, 13-24) disposés en deux rangées d'éléments parallèles (12, 25), l'imprimante en mosaïque comprenant des moyens de déplacement servant à déplacer les rangées d'éléments parallèlement par rapport à un support d'enregistrement (2) dans

l'impression au moyen des éléments d'impression sur le support d'enregistrement, l'imprimante en mosaïque comprenant des moyens pour faire tourner pendant l'impression les deux rangées d'éléments de façon synchrone sur des positions angulaires prédéterminées par rapport à la direction dans laquelle les rangées d'éléments sont déplacées parallèlement par rapport au support d'enregistrement, positions angulaires dont une première position angulaire prédéterminée est telle qu'une impression sensiblement simultanée au moyen des éléments d'impression dans les deux rangées d'éléments dans cette position angulaire d'une impression par les éléments d'impression (3-11) dans une rangée d'éléments (12) sera au moins sensiblement en chevauchement ou sera interfoliée avec une impression par les éléments d'impression (13-24) dans l'autre rangée d'éléments (25) dans la direction (H) du mouvement parallèle, caractérisée en ce que la seconde position angulaire prédéterminée est telle que pendant l'impression sensiblement simultanée au moyen des éléments d'impression dans les deux rangées d'éléments dans cette position angulaire d'une impression par les éléments d'impression (3-11) dans une rangée d'éléments (12) ne sera ni interfoliée avec ni ne chevauchera une impression réalisée par les éléments d'impression (13-24) dans l'autre rangée d'éléments (25) dans la direction du mouvement parallèle.

6. Imprimante en mosaïque selon la revendication 5, caractérisée en ce que les rangées d'éléments dans une des positions angulaires prédéterminées forment un angle horaire d'environ 45° par rapport à la direction du mouvement parallèle et en ce que les rangées d'éléments dans une autre des positions angulaires prédéterminées forment un angle anti-horaire d'environ 45° par rapport au mouvement parallèle.

7. Imprimante en mosaïque selon la revendication 5, dans laquelle les éléments d'impression sont espacés de façon égale dans la rangée d'éléments respective, caractérisée en ce que les rangées d'éléments sont disposées à une distance mutuelle qui est égale à plusieurs fois l'espacement dans l'une ou l'autre rangée d'éléments.

8. Imprimante en mosaïque selon la revendication 5, caractérisée en ce que les rangées d'éléments sont espacées mutuellement à une distance qui est supérieure à la moitié mais égale à moins de la distance totale entre le premier élément d'impression (3) et le dernier élément d'impression (11) dans une rangée d'éléments (12).

9. Imprimante en mosaïque selon la revendication 5, caractérisée en ce que les éléments d'impression dans une rangée d'éléments sont déplacés sur une distance dans la direction commune des rangées d'éléments par rapport aux éléments d'impression dans l'autre rangée d'éléments qui est supérieure à la moitié mais égale à moins de la distance totale entre le premier élément d'impression (3) et le dernier élément d'impression (11) dans une rangée d'éléments (12).

10. Imprimante en mosaïque selon la revendication 5, caractérisée en ce que le nombre d'éléments d'impression dans une rangée d'éléments (25) est supérieur au nombre d'éléments d'impression dans l'autre rangée d'éléments (12).

11. Imprimante en mosaïque selon la revendication 5, caractérisée en ce que le nombre d'éléments d'impression dans une rangée d'éléments (25) est de douze et le nombre d'éléments d'impression dans l'autre rangée (12) est de neuf.1

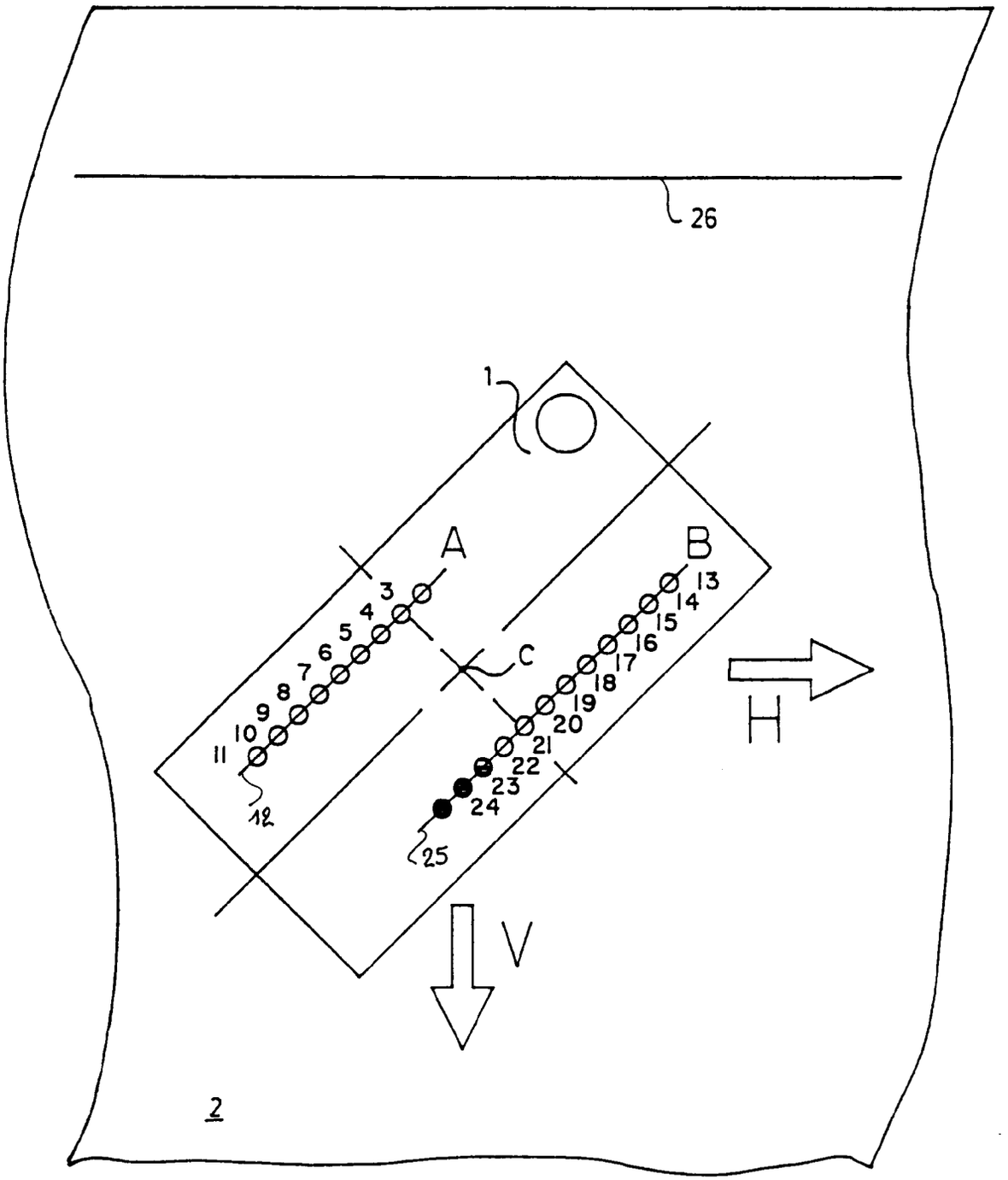


Fig.1

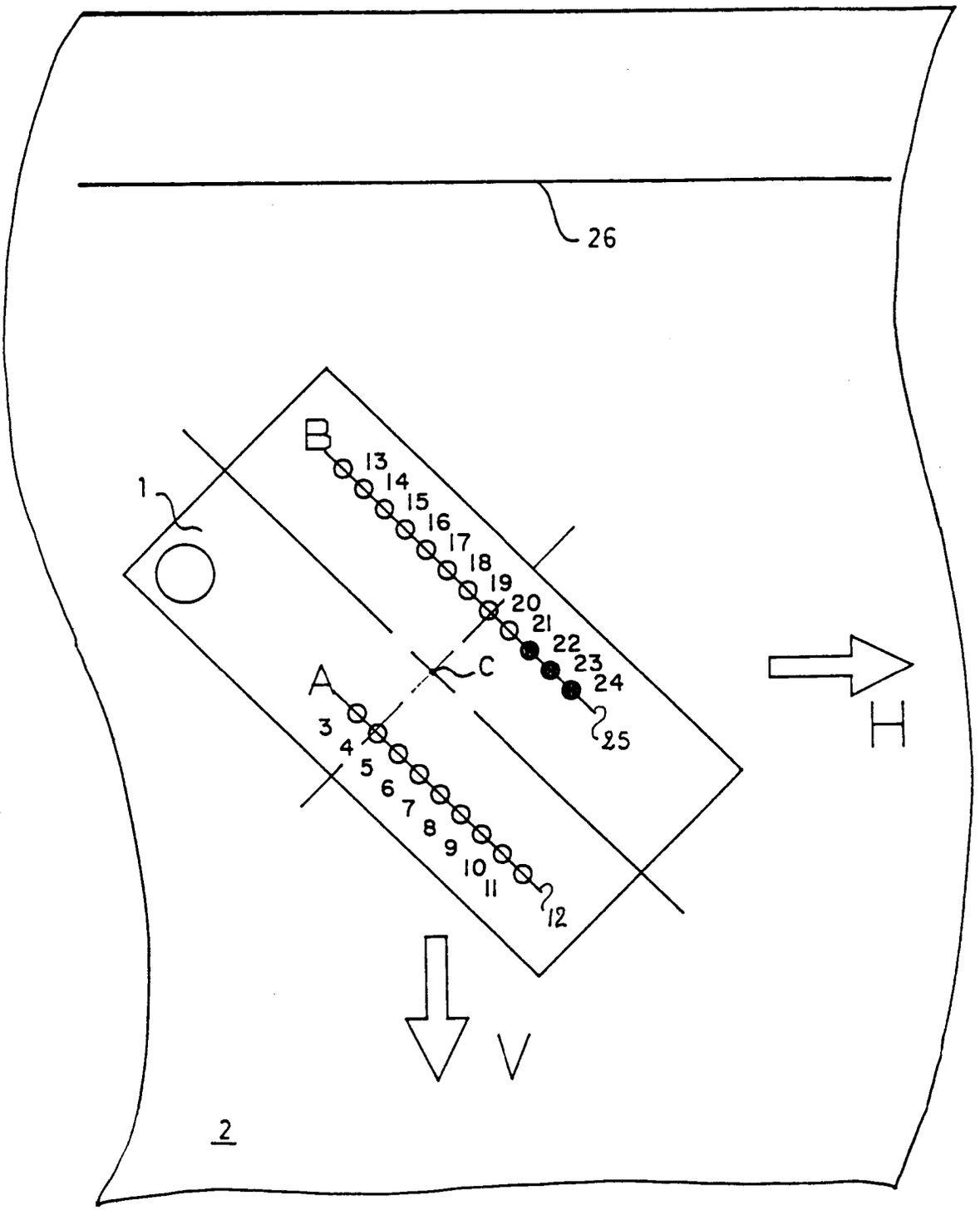
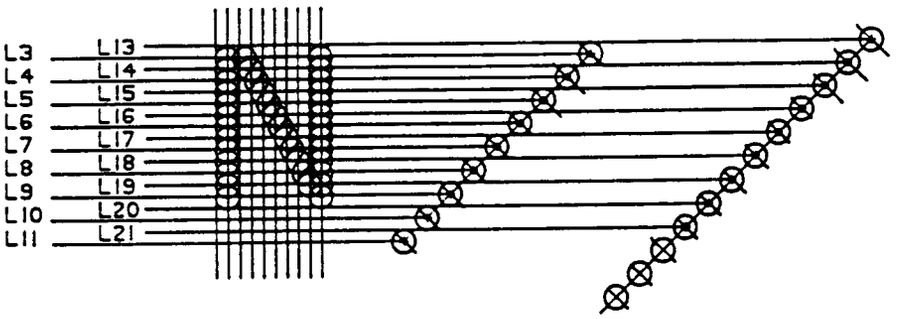


Fig.2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L21
H

Fig.3

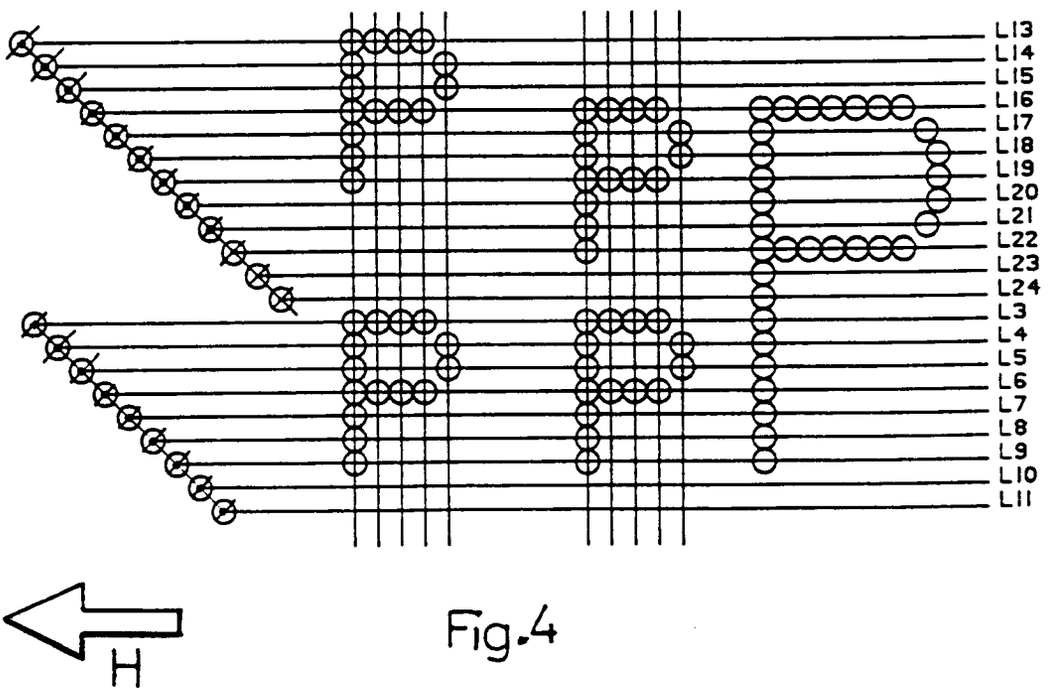
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Fig.4