

Description

The invention relates to a print sheet feeding mechanism for a serial printer in accordance to the precharacterizing clause of claim 1.

A mechanism of said kind is disclosed in JP-A-58151278.

Because serial printers usually print characters, patterns and the like on a print sheet while the print sheet is wrapped around the surface of a platen, they are provided with a sheet bias plate on the bottom side of a print head moving path and a paper bale on the upper side thereof. The upper and lower regions interposing the print head moving path are held by these members to prevent dislocation of the sheet.

With this arrangement, nothing can be printed on the head and tail end regions of a sheet in areas defined by the distance between the print head and the paper bale and the distance between the print head and the sheet bias plate, thereby entailing inconveniences when printing slips, labels, and the like.

The object of the invention is the provision of a print sheet feed mechanism for serial printers capable of printing without producing any dead space in the sheet feed direction.

This object is solved by the print sheet feeding mechanism for a serial printer according to claim 1.

With this sheet feeding mechanism, when a sheet is fed to the print region, it is guided to the platen by the guide plates and the sheet guide, while, when the head end of the sheet arrives at the platen, the sheet is biased on the platen with at least one side of the sheet clamped by the first or second sheet feed roller to prevent dislocation of the sheet at the time of printing.

This dispenses with clamping the sheet at both sides of the platen, thereby allowing printing to be performed while reducing the dead space on the head and tail ends of the sheet as much as possible.

Further advantageous features of this feeding mechanism are evident from the dependent claims and the following description taken in connection with the drawings, wherein

Fig. 1 is a sectional view showing a print sheet feed mechanism of an embodiment of the invention; and

Fig. 2 is a front view of a sheet guide member to be used in the mechanism shown in Fig. 1 as viewed from the print head side.

Fig. 3 is a sectional view of a sheet guide member to be used in the mechanism shown in Fig. 1.

In Fig. 1, reference numeral 41 designates a platen. In a print sheet feed direction (designated by A in Fig. 1), first and second guide plates 42, 43

are arranged so as to interpose the platen 41 therebetween. The guide plates 42, 43 are disposed at positions slightly lower than a plane including the print region on the platen 41, that is, at a level lower toward the platen 41, so that a gap which is wide enough to allow the print sheet to move therethrough is formed between the guide plates 42, 43 and a print sheet guide member (described below).

Outside each of the guide plates 42, 43 are first sheet feed rollers 44 and second sheet feed rollers 45 arranged so that the points of contact of the sheet feed rollers 44, 45 are substantially coplanar with the surfaces of the guide plates 42, 43.

Reference numeral 46 designates a head end guide plate arranged between the second sheet feed rollers 45 and the second guide plate 43, the location of which is viewed in the drawing as being downstream at the time of printing. The head end guide plate 46 is inclined on the entry side the printing sheet.

Reference numeral 47 designates a print head mounted so as to be capable of reciprocating in an axial direction (the direction perpendicular to the drawing sheet in Fig. 1) of the platen 41 by a guide rod (not shown).

Reference numeral 50 designates a sheet guide member. Its width W in the sheet feeding direction is selected so that both ends thereof overlap with the first and second guide plates 42, 43. The sheet guide member 50 is mounted on a carriage so that a predetermined gap is maintained with respect to the guide plates 42, 43. The edge portions 50a, 50b on both entry and exit sides of the print sheet are inclined so as to facilitate the entry of the sheet. The edge portions 50c, 50d in the carriage moving direction are also inclined against the platen 41 so that the sheet will not be drawn in when the carriage moves. A window 51 is formed in the middle, and a sheet bias plate 60 is mounted so as to project toward the platen 1 while being elastically biased by plate springs 61.

Along a line parallel to the carriage moving direction there are provided two sheet detecting elements 70, 71 arranged so as to interpose dot-forming elements therebetween. The sheet bias plate 60 has a flat surface which abuts against the platen 41 and has the belt-like extending spring members 61 formed on both sides thereof in the carriage moving direction. The peripheral portion around the sheet bias plate 60 is reinforced by a synthetic resin frame 63 which is chamfered in both the sheet feeding direction and the carriage moving direction. At a portion confronting the dot-forming elements of the print head 47 there is a dot forming element exposing window 64, while around the dot-forming element-exposing window

64 there are a plurality of spherical projections 65 which project toward the platen 41.

In this embodiment, when the print sheet is fed by driving the first sheet feed rollers 44, the print sheet is moved toward the platen 41 with one of its surfaces guided by the surface of the first guide plate 42 and the other surface by the sheet guide member 50 until it is pressed onto the platen 41 by elasticity or by the firmness of the sheet. Further, when the sheet has been pressed onto the platen 41, the head end of the sheet causes the sheet bias plate 60 to be retracted toward the print head 47, while resisting the elasticity of the spring members 61. As a result, the sheet is elastically biased on the platen 41 by the sheet bias plate 60 when the sheet enters the gap between the platen 41 and the sheet bias plate 60. When the platen 41 is rotated in the sheet feed direction (indicated by the arrow B in Fig. 1) under this state, the head end of the print sheet moves toward the dot-forming element exposing window 64 of the sheet bias plate 60. When the head end is moving, the print sheet is floated up from the dot forming element exposing window 64 by the spherical projections 65, thereby preventing the head end of the print sheet from being caught by the window 64.

When the printing is started upon the head end of the print sheet confronting the window 64, the head end of the print sheet is fixed by being elastically biased on the surface of the platen 41 by the sheet bias plate 60, and characters and patterns are printed by the dot forming elements under this state.

The sheet guide member 50 and the sheet bias plate 60 should of course move as the print head 47 moves. Thus, the sheet has its head end interposed between the sheet bias plate 60 and the platen 41 while clamped by the first sheet feed rollers 44, thereby preventing the print region from moving unexpectedly.

When the head end of the sheet has passed through the second guide plate 43 and arrives at a position immediately before the head end guide plate 46 as printing proceeds, the print head 47, upon reaching the end of a printing line, moves farther to the lateral edge of the sheet without returning to a next line start position. Accordingly, the head end portion of the sheet is squeezed along the second guide plate 43 so as to be biased thereon by the end portion 50b of the sheet guide member 50. As a result, the sheet can enter the head end guide 46 smoothly even when the head end of the print sheet is floated.

It should be noted that the sheet will not, respectively cannot be dislocated unexpectedly under the state of being interposed between the first and second sheet feed rollers 44, because it is biased not only by the sheet bias plate 60 but also

by the sheet feed rollers 44.

As the printing proceeds further and the tail end of the sheet exits from the first sheet feed rollers 44, the sheet has, in a manner similar to that of the head end, not only its print region elastically biased on the platen 41 by the elasticity of the sheet bias plate 60, but also its head end side interposed between the second sheet feed rollers 45, thereby preventing dislocation of the sheet.

While the case where the print sheet is inserted from the first sheet feed rollers 44 has been discussed, the sheet may be set to its print region by rotating the sheet feed rollers 44, 45 and the platen 41 reversely and moving the sheet from the side of the second sheet feed rollers 45.

Further, while a wire-dot print head has been considered as an example in this embodiment, it is obvious that the same advantages can be achieved by an ink jet type print head or thermal transfer type print head.

Moreover, while the case where the print sheet is fed horizontally has been discussed, it is obvious that the same advantages can be provided by feeding the sheet vertically.

As described above, a print sheet feed mechanism of the invention includes a platen for receiving a bias force from the print head, first and second guide plates arranged at both sides of the platen so as to be substantially coplanar with the print region on the platen, first and second sheet feed rollers disposed outside the first and second guide plates, and a sheet guide member which moves together with the print head and at least whose portion confronting the platen is elastically biased on the platen at all times.

Therefore, dislocation of the sheet in the axial direction of the platen can be prevented by either the first or the second sheet feed roller, while the dislocation of the print region can be prevented by the elastic force from the sheet guide member. As a result, the print sheet can be printed without leaving any dead space at its head and tail end regions. If a print head using an inked ribbon is employed, the second sheet guide plate provides a gap between the inked ribbon and the print sheet, thereby dispensing with a ribbon mask.

Claims

1. A print sheet feeding mechanism for a serial printer, comprising:
 - a platen (41) for receiving a bias force from a print head (47),
 - first (42) and second (43) guide plates arranged at both sides of said platen (41) in the sheet feed direction so as to be substantially coplanar with a print region of said platen (41),



64 there are a plurality of spherical projections 65 which project toward the platen 41.

In this embodiment, when the print sheet is fed by driving the first sheet feed rollers 44, the print sheet is moved toward the platen 41 with one of its surfaces guided by the surface of the first guide plate 42 and the other surface by the sheet guide member 50 until it is pressed onto the platen 41 by elasticity or by the firmness of the sheet. Further, when the sheet has been pressed onto the platen 41, the head end of the sheet causes the sheet bias plate 60 to be retracted toward the print head 47, while resisting the elasticity of the spring members 61. As a result, the sheet is elastically biased on the platen 41 by the sheet bias plate 60 when the sheet enters the gap between the platen 41 and the sheet bias plate 60. When the platen 41 is rotated in the sheet feed direction (indicated by the arrow B in Fig. 1) under this state, the head end of the print sheet moves toward the dot-forming element exposing window 64 of the sheet bias plate 60. When the head end is moving, the print sheet is floated up from the dot forming element exposing window 64 by the spherical projections 65, thereby preventing the head end of the print sheet from being caught by the window 64.

When the printing is started upon the head end of the print sheet confronting the window 64, the head end of the print sheet is fixed by being elastically biased on the surface of the platen 41 by the sheet bias plate 60, and characters and patterns are printed by the dot forming elements under this state.

The sheet guide member 50 and the sheet bias plate 60 should of course move as the print head 47 moves. Thus, the sheet has its head end interposed between the sheet bias plate 60 and the platen 41 while clamped by the first sheet feed rollers 44, thereby preventing the print region from moving unexpectedly.

When the head end of the sheet has passed through the second guide plate 43 and arrives at a position immediately before the head end guide plate 46 as printing proceeds, the print head 47, upon reaching the end of a printing line, moves farther to the lateral edge of the sheet without returning to a next line start position. Accordingly, the head end portion of the sheet is squeezed along the second guide plate 43 so as to be biased thereon by the end portion 50b of the sheet guide member 50. As a result, the sheet can enter the head end guide 46 smoothly even when the head end of the print sheet is floated.

It should be noted that the sheet will not, respectively cannot be dislocated unexpectedly under the state of being interposed between the first and second sheet feed rollers 44, because it is biased not only by the sheet bias plate 60 but also

by the sheet feed rollers 44.

As the printing proceeds further and the tail end of the sheet exits from the first sheet feed rollers 44, the sheet has, in a manner similar to that of the head end, not only its print region elastically biased on the platen 41 by the elasticity of the sheet bias plate 60, but also its head end side interposed between the second sheet feed rollers 45, thereby preventing dislocation of the sheet.

While the case where the print sheet is inserted from the first sheet feed rollers 44 has been discussed, the sheet may be set to its print region by rotating the sheet feed rollers 44, 45 and the platen 41 reversely and moving the sheet from the side of the second sheet feed rollers 45.

Further, while a wire-dot print head has been considered as an example in this embodiment, it is obvious that the same advantages can be achieved by an ink jet type print head or thermal transfer type print head.

Moreover, while the case where the print sheet is fed horizontally has been discussed, it is obvious that the same advantages can be provided by feeding the sheet vertically.

As described above, a print sheet feed mechanism of the invention includes a platen for receiving a bias force from the print head, first and second guide plates arranged at both sides of the platen so as to be substantially coplanar with the print region on the platen, first and second sheet feed rollers disposed outside the first and second guide plates, and a sheet guide member which moves together with the print head and at least whose portion confronting the platen is elastically biased on the platen at all times.

Therefore, dislocation of the sheet in the axial direction of the platen can be prevented by either the first or the second sheet feed roller, while the dislocation of the print region can be prevented by the elastic force from the sheet guide member. As a result, the print sheet can be printed without leaving any dead space at its head and tail end regions. If a print head using an inked ribbon is employed, the second sheet guide plate provides a gap between the inked ribbon and the print sheet, thereby dispensing with a ribbon mask.

Claims

1. A print sheet feeding mechanism for a serial printer, comprising:
 - a platen (41) for receiving a bias force from a print head (47),
 - first (42) and second (43) guide plates arranged at both sides of said platen (41) in the sheet feed direction so as to be substantially coplanar with a print region of said platen (41),



- first and second pairs of sheet feed rollers (44,45) disposed outside said first and second guide plates (42,43), and
 - a sheet guide member (50) moving together with said print head (47), at least portion (60) of said sheet guide member (50) confronting said platen (41)
- characterised in that
- said portion (60) of said sheet guide member (50) is elastically biased on said platen (41) at all times.

2. The print sheet feeding mechanism of claim 1, wherein said sheet guide member (50) has peripheral portions (50a, 50b, 50c, 50d) thereof inclined in both a carriage shaft direction and a print sheet moving direction (A), end portions (50a, 50b) in said print sheet moving direction confronting said first and second guide plate (42, 43), and a sheet bias plate (60) elastically biased on said platen (41) at all times being arranged at a portion confronting dot forming elements of said print head (47).
3. The print sheet feeding mechanism of claim 2, wherein said sheet bias plate (60) has a window (64) formed at said portion confronting said dot forming elements and spherical projections (65) formed around said window so that said spherical projections (65) project toward said platen (41).
4. The print sheet feeding mechanism of claim 2 or 3, wherein said sheet bias plate (60) has a flat surface which abuts against said platen, and belt-like extending spring members (61) formed on both sides thereof in the carriage moving direction.
5. The print sheet feeding mechanism of one of claims 1 to 4, further comprising a frame (63) for reinforcing peripheral portions of said sheet bias plate (60).

Patentansprüche

1. Druckblattzuführmechanismus für einen Seriendrucker mit:
 - einer Walze (41) zum Aufnehmen einer Spannkraft von einem Druckkopf (47),
 - ersten (42) und zweiten (43) Führungsplatten, die an beiden Seiten der Walze (41) in Blattzuführrichtung angeordnet sind, so daß sie im wesentlichen mit einem Druckbereich der Walze (41) in einer Ebene liegen,
 - ersten und zweiten Paaren von Blattzuführwalzen (44, 45), welche außerhalb

- der ersten und zweiten Führungsplatten (42, 43) angeordnet sind, und
- einem sich zusammen mit dem Druckkopf (47) bewegenden Blattführungselement (50), wobei mindestens ein Bereich (60) des Blattführungselements (50) der Walze (41) gegenüberliegt,
- dadurch gekennzeichnet, daß
- der Bereich (60) des Blattführungselements (50) die ganze Zeit über auf der Walze (41) elastisch gespannt ist.

2. Druckblattzuführmechanismus gemäß Anspruch 1, bei dem sich auf dem Blattführungselement (50) periphere Bereiche (50a, 50b, 50c, 50d) befinden, welche sowohl in eine Richtung der Schlittenwelle als auch in eine Richtung (A) der Bewegung des Druckblattes geneigt sind, wobei Endbereiche (50a, 50b) in der Richtung der Bewegung des Druckblattes der ersten und zweiten Führungsplatte (42, 43) gegenüberliegen, und wobei eine Blattspannplatte (60) die ganze Zeit über elastisch auf der Walze (41) gespannt und in einem Bereich angeordnet ist, welcher Punktbildungselementen des Druckkopfs (47) gegenüberliegt.
3. Druckblattzuführmechanismus gemäß Anspruch 2, bei dem die Blattspannplatte (60) ein Fenster (64), welches in dem den Punktbildungselementen gegenüberliegenden Bereich gebildet ist, sowie sphärische Vorsprünge (65) aufweist, welche um das Fenster herum gebildet sind, so daß die sphärischen Vorsprünge (65) in Richtung zur Walze (41) vorstehen.
4. Druckblattzuführmechanismus gemäß Anspruch 2 oder 3, wobei die Blattspannplatte (60) eine ebene Oberfläche aufweist, welche an die Walze stößt, und sich bandartig erstreckende Federelemente (61), welche darauf an beiden Seiten in Richtung der Bewegung des Schlittens gebildet sind.
5. Druckblattzuführmechanismus gemäß einem der Ansprüche 1 bis 4, der desweiteren einen Rahmen (63) zur Verstärkung von peripheren Bereichen der Blattspannplatte (60) aufweist.

Revendications

1. Mécanisme d'alimentation feuille à feuille d'impression pour imprimante série, comprenant :
 - un cylindre (41) pour recevoir une force d'inclinaison provenant d'une tête d'impression (47) ;
 - des première (42) et seconde (43) plaques de guidage disposées des deux côtés dudit



cylindre (41) dans la direction d'avancement des feuilles de telle manière qu'elles sont sensiblement dans le même plan qu'une zone d'impression dudit cylindre (41) ;

des première et seconde paires de rouleaux d'avancement des feuilles (44, 45) disposées à l'extérieur desdites première et seconde plaques de guidage (42, 43) ; et,

un organe de guidage des feuilles (50) se déplaçant avec ladite tête d'impression (47), au moins une partie (60) dudit organe de guidage des feuilles (50) se trouvant en face dudit cylindre (41),

caractérisé en ce que :

ladite partie (60) dudit organe de guidage des feuilles (50) est inclinée élastiquement sur ledit cylindre (41) à tout moment.

(63) pour renforcer les parties périphériques de ladite plaque d'inclinaison des feuilles (60).

2. Mécanisme d'alimentation feuille à feuille d'impression selon la revendication 1, dans lequel ledit organe de guidage des feuilles (50) comporte des parties périphériques (50a, 50b, 50c, 50d) inclinées à la fois dans une direction de déplacement d'un chariot et une direction de déplacement des feuilles d'impression (A), des extrémités (50a, 50b) dans ladite direction de déplacement des feuilles d'impression se trouvant en face desdites première et seconde plaques de guidage (42, 43), et une plaque d'inclinaison des feuilles (60) inclinée élastiquement sur ledit cylindre (41) à tout moment étant placée dans une partie se trouvant en face d'éléments de formation de points de ladite tête d'impression (47).
3. Mécanisme d'alimentation feuille à feuille d'impression selon la revendication 2, dans lequel ladite plaque d'inclinaison des feuilles (60) comporte une fenêtre (64) formée dans ladite partie se trouvant en face desdits éléments de formation de points, et des parties saillantes sphériques (65) formées autour de ladite fenêtre, de telle sorte que lesdites parties saillantes sphériques (65) dépassent vers ledit cylindre (41).
4. Mécanisme d'alimentation feuille à feuille d'impression selon l'une quelconque des revendications 2 et 3, dans lequel ladite plaque d'inclinaison des feuilles (60) comporte une surface plate qui vient buter contre ledit cylindre, et des ressorts s'étendant comme des courroies (61) formés de ses deux côtés, dans la direction de déplacement du chariot.
5. Mécanisme d'alimentation feuille à feuille d'impression selon l'une quelconque des revendications 1 à 4, comprenant en outre un cadre