

"PLATEN ASSEMBLY, E.G. FOR USE IN A PRINTER"

The present invention relates to a platen assembly, e.g. for use in a printer. Such a platen assembly may, for example, comprise a paper feeding mechanism for inserting or withdrawing paper; means for mounting a frame on a support plate; and a carriage driving mechanism for moving a carriage in the lateral direction.

A printer may have a paper bail which receives paper from a guide plate and which presses the paper against a platen on the discharge side of a printing head. Such a paper guide plate, however, needs to be made very accurately in order to guide the paper correctly to a given position. If the guide plate is made of polymeric materials, the plate thickness must be considerable in order to ensure that it can be maintained at the given position, thereby increasing costs.

Further, a printer normally has a paper bail or paper pressing plate formed of a metallic material having high frictional characteristics and, accordingly, the feeding of the paper requires a lot of force. Furthermore, the pressure of the paper pressing plate against the platen cannot be reduced even if a paper is employed which has holes engaged by a sprocket or a tractor and, accordingly, the said holes become deformed so that the paper is fed at the wrong pitch.

The paper bail, moreover, requires a complicated operation. Namely, the paper bail is kept apart from the platen surface until the paper is at the said given position and is thereafter returned to the original position. This is because the end of paper leaving the platen contacts the paper bail. In particular, in a printer in which separate sheets of paper are automatically set in position, a mechanism for automatically opening or closing the paper bail is required, thereby causing the printer structure to be complicated.

Furthermore, if a timing belt is employed to move the carriage of the printer, since the accuracy of the printing depends upon the tension of the timing belt which is mounted on a support plate, the latter has had to be made of metallic material and to be separated from a frame of the printer. Generally, the frame must be secured to the support plate by screws and, accordingly fabrication of these parts requires considerable time and trouble.

Moreover, in a known printer, a motor for driving the printer carriage is fixed to a frame by screws or the like. A belt extends between a driving pulley fixed to the motor shaft and follower pulley positioned near to the other end of the frame. The tension of the belt is controlled by adjusting the position of the motor or of the follower pulley.

According to the present invention, there is provided a platen assembly comprising a platen; a paper guide plate having an inclined substantially vertical surface for guiding paper to the platen, the inclined surface leading to a curved surface whose curvature is similar to that of the platen; and paper controlling means for controlling the position of paper leaving the platen, the paper controlling means having at least one rib provided with first and second surfaces which meet at a junction, each of the first and second surfaces lying in a respective plane which is inclined to an horizontal plane containing the axis of the platen; the arrangement being such that paper leaving the platen travels over the first surface to the junction and then travels over the second surface and so away from the platen.

The paper guide plate may be provided at its rear with support means by means of which it is mounted on a wall of a frame which carries the platen.

Preferably, the assembly comprises bail means operable to press the paper against the platen.

The bail means may comprise first and second plates which are arranged side by side, the first plate having a substantially lower coefficient of friction than the second,

the first plate being engageable with the paper, and the second plate being more resilient than the first plate and being operable to urge the latter towards the platen so as to press the paper against the platen.

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The first plate may be made of polymeric material, the second plate being made of metallic material.

The assembly may comprise a printing head which is arranged on the discharge side of the bail means.

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The assembly may comprise a pressing roller, resilient means for urging the pressing roller towards the platen, and control means for moving the pressing roller away from the platen.

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The control means may be settable in first and second positions in which the pressing roller is respectively adjacent to and spaced from the platen, the control means causing the bail means to apply greater pressure to the paper when the control means is in the said first position than when it is in the said second position.

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Thus the control means may be arranged to alter the flexure of the bail means, the control means, when in the said first position, causing greater flexure of the bail means than when the control means is in the said second position.

The platen assembly may comprise a carriage which is movable transversely of the platen and which carries a printing head; drive means for moving the carriage; drive transmitting means for transmitting the drive from said drive means to said carriage; and a resilient means which is engaged with said drive means so as to urge the latter in a direction such that the drive transmitting means is tensioned.

The assembly may comprise a support plate which carries carriage moving means, the support plate being detachably connected to the said frame.

Preferably, the support plate is connected to the said frame in such a way as to take up slack therebetween.

The frame may be provided with at least one projection which, when the support plate is attached to the said frame, resiliently engages a part of the support plate so as to take up slack.

The carriage moving means may comprise a belt and means for maintaining said belt at substantially constant tension.

The invention also comprises a printer provided with a platen assembly as set forth above.

The invention additionally comprises a platen assembly comprising a platen; a pressing roller; resilient means for urging the pressing roller towards the platen; bail means operable to press paper against the platen; and a control means which is settable in first and second positions in

which the pressing roller is respectively adjacent to and spaced from the platen, the control means causing the bail means to apply greater pressure to the paper when the control means is in the said first position than when it is in the said second position.

The resilient means may comprise a first plate made of polymeric material and a second plate made of metal.

The support means of the paper guide plate may be provided in the vicinity of the boundary between the inclined surface and the curved surface. As a result, an accurate clearance between the platen and the paper guide plate may be obtained, and the manner in which the paper guide plate is mounted, enables it to be flexible and to avoid warping. Further, since the paper guide plate is flexibly mounted automatic fabrication can be utilized without having to employ fixing members such as screws.

The bail means may comprise a metallic plate and a high polymer plate which are fixed into claws of the said frame and which are engageable by a pressure adjustable lever. In such an arrangement, special fixing members are not required. Therefore, the fabrication may be by mass production.

The paper controlling means employing the said ribs enables one, if desired, to dispense with a paper bail and thereby dispense with a number of members, and a number of fabricating steps, so that the cost can be reduced. In addition, since the end portion of the paper is guided by the said inclined surface when the paper is inserted, special opening and closing means as used with a paper bail are not required and, accordingly, the automatic paper inserting movement is simplified.

At the said first position of a lever forming part of the said control means, the pressing roller may be pressed up against the platen, and paper pressing plates may be strongly pressed against the platen. Consequently, card paper having no holes therein can be fed in accordance with

the rotation of the platen. At the second position of the said lever, the pressing roller may be separated from the platen, and the paper pressing plates may be pressed with a weak force against the platen. Therefore, continuous stationery having continuous lines of holes can be fed by sprockets at the correct pitch.

The frame may have a projecting piece which is provided at each side of a reference surface, either the upper or the lower side of which receives a surface of the support plate. At least one side of the projection piece may be provided with at least one projection for taking up slack in the vicinity of the reference surface. In addition, at each end of the reference surface there may be provided, integrally therewith, a wall whose width is equal to that of the support plate, and claws having oppositely sloping surfaces, the arrangement being such that the support plate can directly contact the reference surface. Therefore, when the printer is built, the support plate can be easily fixed to the frame, e.g. by causing a projection on the one part to enter a hole or window in the other. Further, after fixing the window over the projection, any manufacturing tolerance in the axial direction can be taken up by the projection or projections on the frame, thereby ensuring stability therebetween. The use of claws and flexible parts enables any slack in the upward, downward, left or right directions to be taken up.

The invention is illustrated, merely by way of example, in the accompanying drawings, in which:-

Figure 1(a) is a perspective view of a printer incorporating a platen assembly according to the present invention,

5 Figure 1(b) is a sectional view of part of the printer of Figure 1(a), Figure 1(b) illustrating a paper guide means,

Figures 2 and 3 are perspective views of a paper guide plate forming part of the printer of Figure 1(a),

10 Figure 4 is an exploded, perspective view of paper pressing plates which form part of the printer of Figure 1(a),

Figures 5 and 6(a) and (b) are a side view and an exploded, perspective view respectively of a release lever and a force transmitting member respectively which form parts of
15 the printer of Figure 1(a),

Figure 7 is a sectional view showing a paper feeding mechanism for feeding continuous stationery which may form part of the printer of Figure 1(a),

20 Figure 8 is a schematic view showing part of the mechanism of Figure 7,

Figure 9 is a sectional view similar to that of Figure 7 but showing a paper feeding mechanism for feeding a single sheet of paper,

25 Figure 10 is a schematic view showing part of the mechanism of Figure 9,

Figure 11 is a perspective view of a paper controlling means forming part of the printer of Figure 1(a),

Figure 12 is a side view of part of the structure of Figure 11 showing a rib thereof,

5 Figure 13 illustrates the movement of a sheet of paper through the paper controlling means,

Figure 14 is a perspective view of a printer having a continuous paper feeding mechanism,

10 Figure 15 is a perspective view of a frame and a support plate which may be employed in the printer of Figure 1(a),

Figures 16(a) and (b) are plan views of parts of a frame forming part of the printer of Figure 1(a),

Figure 17 illustrates the assembly of parts of the said frame, and

15 Figure 18 is an exploded, perspective view of a carriage driving mechanism forming part of the printer of Figure 1(a).

20 Figures 1(a) and 1(b) show an embodiment of a printer incorporating a platen assembly according to the present invention. The printer comprises a paper guide plate 10 for guiding paper to a platen 1, first and second paper pressing plates 50, 56, and a paper controlling means 30, the parts 1, 10, 50, 56, 30 being provided on a frame 40. A paper pressing roller 2 is mounted beneath the platen 1,
25 and a printing head 3 is mounted adjacent to the platen 1,

the printing head 3 being arranged on the discharge side of the bail means constituted by the plates 50, 56.

5 The printing head 3 is mounted on a carriage 4 which is supported by a guide rod 8 and a guide plate 9 so that the carriage 4 may slide longitudinally of the platen 1. A timing belt 112 is fixed to the carriage 4, the latter being driven by a pulse motor 7 which is mounted on a frame plate or support plate 100 fixed to the frame 40.

10 As shown in Figures 2 and 3, the paper guide plate 10 is provided on the frame 40 and extends adjacent to the circumference of the platen 1. In order to guide a sheet of paper from an insertion portion of the platen 1 to the paper pressing roller 2, the paper guide plate 10 has a sloping portion 11 for receiving a paper sheet (see Figure 1(b)).
15 The paper guide plate 10 has a curved, part-cylindrical, portion 12 whose curvature corresponds to the curvature of the platen 1, the curved portion 12 being provided at the lower end of the sloping portion 11. Notches 13 are formed in the end part of the curved portion 12 opposite to the paper pressing roller 2.
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On the rear side of the paper guide plate 10, as shown in Figure 3, a plurality of bifurcated members 14 are provided in series in the vicinity of the boundary between the sloping portion 11 and the curved portion 12 and are disposed
25 at an angle to the sloping portion 11 so that, when mounted

on a rear wall 41 of the frame 40, they ensure that the curved portion 12 is spaced from the platen 1. Each bifurcated member 14 is provided with a claw 15 which is resiliently engaged with the frame 40 when the bifurcated members 14 are mounted on the upper surface of the rear wall 41.

In the frame 40, in which movable members such as the platen 1 and the carriage 3 are mounted, the rear wall 41 is formed in such a way that there is a predetermined clearance between the curved portion 12 and the platen 1 by virtue of the shape of the guide plate 10. The rear wall 1 has a plurality of contact portions 42 having sloping surfaces 42a (see Figure 1b) on the carriage side so that the rear side of the paper guide plate 10 is supported. A plurality of projections 43, each having a sloping portion 43a, are provided on the rear wall 41 for engagement with the claws 15, so as to provide the sloping portion 11 with resilience. A window 18 is provided in the sloping portion 11 through which may extend a detector member (not shown) of a paper detector for detecting whether printing paper is present or not.

When the plurality of bifurcated portions 14 on the rear side of the paper guide plate 10 are pushed down over the rear wall 41, the bifurcated portions 14 respectively engage the plurality of contact portions 42 of the rear wall

41 and the plurality of claws 15 on the rear of the sloping portion 11 are then bent outwardly by the plurality of sloping portions 43a of the projections 43 and engage behind the latter. As a result, the whole paper guide plate 10 is accurately positioned. Thus the curved portion 12 is positioned with respect to the platen 1 by the engagement between the rear wall 41 of the frame 40 and the plurality of bifurcated portions 14 due to the flexibility of the guide plate 10. At the same time, any warp or deformation of the sloping portion 11 is corrected by the backwardly directed resilient force exerted by the plurality of claws 15.

Figure 4 shows an example of the bail means employed in the printer. The first paper pressing plate or bail 50 extends to a position adjacent the surface of the platen 1. The upper end portion of the first paper pressing plate 50, which is adapted to directly contact the platen 1, may be bent towards the carriage 4. On the lower part of the first paper pressing plate 50 there are provided in the lengthwise direction a plurality of holes 52 in which a plurality of claws or projections 44 are respectively fitted, the claws or projections 44 extending from the frame 40. Between the holes 52, there are a plurality of windows 53 for adjusting the flexibility of the first paper pressing plate 50, the latter being made in polymeric material. A second paper pressing plate or bail 56 is made of metallic material

and is provided on the first paper pressing plate 50 in side by side relationship therewith. The first paper pressing plate 50 has a substantially lower coefficient of friction than that of the second paper pressing plate 56. The latter, however, is more resilient than the first paper pressing plate 50. Similarly to the construction of the first paper pressing plate 50, the second paper pressing plate 56 is provided with a plurality of holes 57, in which the plurality of claws 44 of the frame 40 are respectively fitted, and a plurality of windows 58.

Each of the plurality of projections or claws 44 has a sloping portion 44a which is inclined vertically so that the upper ends of the paper pressing plates 50 and 56 may contact the discharge portion of the platen 1 on the carriage side. A stop member 45 is provided at a somewhat lower position than that of the plurality of claws 44 (see Figure 1(b)), and a clearance is thus provided between the stop member 45 and the claws 44 in which the first and second paper pressing plates 50, 56 can be inserted.

When the first and second paper pressing plates 50, 56 are positioned so that the holes 52, 57 are aligned with the corresponding claws 44, and the plates 50, 56 are pressed down, the lower ends of each of the paper pressing plates 50, 56 pass over the sloping portions 44a and are inserted into the clearance adjacent the stop member 45. Then the claws 44 pass into the holes 52, 57, so that the paper

pressing plates 50, 56 are retained in position.

5 A release shaft 60 has a plurality of projections 61 and a surface 62. The release shaft 60 and thus the projections 61, is rotatable by a release lever 63 which is described later, the projections 61 being adapted to contact the second paper pressing plate 56, thereby subjecting it to a large force. However, when the projections 61 are out of contact with the second paper pressing plate 56, the latter is contacted by the surface 62 so that the paper pressing plates 50, 56 are subjected to a weak force.

10 On the one side of the frame 40 there is formed a pin 46a (Figure 5(b)) in which the release lever 63 is inserted and an arcuate window 46b in which is mounted a projection or claw 63c of the release lever 63. A circular hole 47 (Figure 6) is provided in the frame 40 through which passes the end of the release shaft 60.

15 The release lever 63 is provided with a hole 63a, a projection 63b and the projection or claw 63c. The hole 63a is engaged by the pin or projection 46a on the axis of the release lever 63. The projection 63b is engaged by a force transmitting member 65 at the end portion of the release shaft 60 when the release lever 63 is inserted onto the pin 46a. The claw 63c can be introduced into the circular window 46b and can be moved in the tangential direction at the rear when the release lever 20 25 63 is inserted onto the pin 46a.

The force transmitting member 65 (see Figure 6)

has an axial hole 65a, an elongated hole 65b and a claw 65c. The axial hole 65a is engaged with the end of the release shaft 60 which extends outwardly from the frame 40 so that it is relatively rotatable. The elongated hole 65b is engaged with the projection 63b of the release lever 63 at the front side when the force transmitting member 65 is mounted on the frame 40. The claw 65c is engaged with the hole 47 of the frame 40 so that it is rotatable at the rear side when the force transmitting member 65 is mounted on the frame 40.

On the lever 63 there is provided a groove 63d (Figure 5) for causing the paper pressing roller 2 to move upwardly with respect to an axial portion 2a (Figure 7). The paper pressing roller 2 is mounted in a guide groove 48 (Figure 1(b)) formed in the frame 40 so that the paper pressing roller 2 can be moved up and down. The paper pressing roller 2 is urged in the direction of the platen 1 by a coil spring 120 which is mounted in a guide hole 49 of the frame 40 (see Figure 1b).

When the release lever 63 is in the position shown in Figure 8, the axial portion 2a of the paper pressing roller 2 is caused to move upwardly by the wall of the groove 63d. A clearance is provided between the platen 1 and the paper pressing roller 2 against the force of the coil spring 120. When the release lever 63 is in the position shown in Figure 10, the paper pressing roller 2 is pressed against the platen 1 by the force of the coil spring 120.

When the release lever 63 is positioned so that the pin 46a and the arcuate window 46b are in a predetermined position and then the release lever 63 is pressed down, the claw 63c is pressed against the side of arcuate window 46b and is flexibly deformed centrally thereof so as to enter the rear side of the frame 40. In this condition, when the force transmitting member 65 is urged to the side of the frame 40 by aligning the axial hole 65a and the elongated hole 65b of the force transmitting member 65 with the end of release shaft 60 and the projection 63b of the release lever 63, respectively, the claw 63c enters the hole 47 of the frame 40, thereby preventing the force transmitting member 65 from being removed from the frame 40 and thereby being rotatable.

In the condition described immediately above, when the release lever 63 is rotated in the tangential direction, the release shaft 60 is rotated by way of the force transmitting member 65. When the plurality of projections 61 directly contact the paper pressing plates 50, 56, the latter are strongly urged against the platen 1, thereby smoothly transmitting the rotation of the platen 1 to paper held against the latter. The first paper pressing plate 50, which contacts the said paper, has a low coefficient of friction therewith and permits smooth paper

feeding. This condition is illustrated in Figures 9 and 10, in which the paper pressing roller 2 is pressed against the platen 1 mentioned as above. In the construction of Figures 9 and 10, a single sheet of paper K is closely urged against the platen 1 and follows the rotation of the latter.

Figures 7 and 8 show an embodiment of a paper feeding mechanism for use with continuous stationery. In this case the release lever 63 is rotated to the opposite side. The surface 62 of the release shaft 60 contacts the paper pressing plate 56, thereby ensuring that there is little friction between the platen 1 and the paper. Further, as mentioned above, the paper pressing roller 2 is spaced from the platen 1. In the construction shown in Figure 7, sprocket pins 81a of sprockets 81 are inserted into the holes of continuous paper F, thereby feeding the continuous paper F in the direction indicated by the arrow A. In order to ensure that the sprockets 81 feed the paper F at the correct pitch, the pressure of the paper pressing plates 50, 56 is reduced, the paper pressing roller 2 is separated from the platen 1, and the circumferential speed of the platen 1 is arranged to be less than that of the paper feed speed. Accordingly, the continuous paper F is fed so as to slide over the surface of the platen 1.

Figure 11 shows an embodiment of the paper controlling means 30. A rotatable upper cover 5 is rotatably mounted

on the upper end portion of the case of the printing head 3. On the end portion of the paper controlling means there are provided a plurality of ribs 31 which are arranged so that they are at right angles to the axle of the platen 1.

5 Figure 12 shows an example of a rib 31 of the paper controlling means 30. The rib 31 has a first slope or sloping surface 31a, a vertex 31b and a second slope or sloping surface 31c. The first slope 31a guides the end portion of a sheet of paper to the inner
10 part of the platen surface when the upper cover 5 is mounted on the case 6 (Figure 14) of the printer. The vertex 31b, which is disposed at the junction of the slopes 31a, 31c, and which is vertically aligned with the axis of the platen 1, presses the paper against the
15 platen 1 so that the space between the vertex 31b and the paper is as small as possible. The second slope 31c upwardly guides the portion of the paper on which printing is completed.

 Thereafter, the movement of the paper controlling means 30 is described with reference to Figure 13.

20 When the upper cover 5 is fixed to printer case 6, and a sheet of paper K is inserted between the platen 1 and the paper guide plate 10 (Figure 13, I), a sensor (not shown) detects whether paper is present and then,
25 if paper is present, rotates the platen 1. The sheet of paper K is guided along the sloping portion 11 of the guide plate 10 to the curved portion 12 thereof and is then passed to the

paper pressing plates 50, 56. The first paper pressing plate 50, which is made of a polymer, directly contacts the paper surface, and the second paper pressing plate 56, which is metallic, presses against the first paper pressing plate 50. As
5 a result, the end portion of the sheet of paper K is securely inserted into a paper guiding portion D of the carriage 4 and is pushed out of the latter. The paper slides with extremely small friction since it is contacted by the polymeric material of the plate 50, and the paper is smoothly
10 fed in unison with the rotation of the platen 1 since the paper is pressed, by the strong force of the second paper pressing plate 56, against the platen 1 whose surface is made of rubber.

Thus the end portion of the sheet of paper K which
15 is pushed out of the carriage is fed upwardly by the platen 1. Then the sheet of paper K directly contacts the first slope 31a of each rib 31 (Figure 13, II). The sheet of paper K is then moved along the slope 31a to the front (i.e. to the right as seen in Figure 13), thereby reaching the vertex
20 31b (Figure 13, III).

As a result, the sheet of paper K is pressed by the vertex 31b against the resilient force exerted by the paper in the vicinity of the printing head 3.

Thus, when the sheet of paper K is inserted to the
25 predetermined position, the rotation of platen 1 is stopped

and printing is started. When one line of printing has been completed, the platen 1 is rotated through an angle sufficient to allow for the size of printing. The portion of the paper on which printing has been completed is
 5 ejected upwards along the second slope 31c (Figure 13, IV) of each of the ribs 31.

Figure 14 shows another example of a continuous paper feeding mechanism for the printer. A continuous paper feeding mechanism 80 comprises sprockets 81 which are
 10 slidable axially in accordance with the paper width along a fixed shaft 82. The continuous paper feeding mechanism 80 is connected to a rotary shaft 84 which can be driven by a gear train 83 by means of a gear wheel 1a on the platen shaft, and end plates 85 are provided at both ends
 15 of the rotary shaft 84 and the fixed shaft 82. At the lower ends of the end plates 85, claws 86 and 87 are provided which extend forwardly and backwardly and which can be attached to or removed from openings 6a of the printer case 6.

Figure 15 shows the frame plate or support plate 100 which carries the pulse motor 7 and the timing belt 112 and which is fixed to the frame 40. The frame plate 100 is made of metal such as steel, and pulleys 113 are provided at
 20 opposite ends of the frame plate 100. The frame 40 is formed by injection moulding so that the principal parts
 25 comprising the platen 1 and the paper guide plate 10 can

be mounted thereon. On one side of the frame plate 100 there is provided a rectangular window 111 having a side 111a which extends transversely of the frame plate 100 so that a projection piece 421 of the frame 40 as mentioned later is fitted in the window 111.

On opposite sides of the lower portion of the frame 40 there are formed walls 422 and 422' respectively. Each of the walls is separated from the other so as to accommodate the width of the end portion of the frame plate 100, reference surfaces 423 and 423' are arranged transversely of the walls 422 and 422', respectively. At the reference surface 423 of the frame 40 there is provided the projection piece 421 having a sectional configuration which coincides with that of the window 111. The projection piece 421 is formed integrally with a plurality of projections 421a which extend vertically and which have sufficient height to cater for variations in the positions of the parts, as shown in Figure 16.

On opposite sides of the reference surface 423 there are formed integrally therewith two claws 424 having sloping portions 424a which are inclined inwardly so that the reference surfaces 423 and 423' are pressed by the rear of the frame plate 100.

The frame plate 100, as indicated above, is provided with the pulleys 113, the pulse motor 7 and the timing belt

112 provided therebetween. The frame plate 100 with its window 111 and the projection piece 421 of the frame are moved relatively to couple them together. Opposite sides of the frame plate 100 are guided by sloping portions 424_a of claws 424 and of claws 424' opposite thereto and are thus moved to the reference surfaces 423 and 423' so that the claws 424 and 424' are transverse thereto.

The window 111 of the frame plate 100 is then fitted over the projection piece 421, so that the projections 421_a of the projection piece 421, which are formed of softer material than that of the window 111, engage the latter, thereby taking up any difference in size between the axial extent of the window 111 and the projection piece 421. Thus, when the frame plate 100 contacts the reference surface 423, the frame plate 100 is stopped by the claws 424 and 424' at the rear thereof and is acted on by the reference surfaces 423 and 423'. In addition, the frame plate 100 is pressed resiliently against the walls 422 and 422' at a given portion in the width direction (see Figure 17, I). When the parts are fixed together, a clip member K' formed of a flexible metallic thin plate is fixed to the end portion of the frame plate 100, and directly contacts an end portion K1 with the guide shaft 8 (see Figure 1(a)). As a result, the frame 40 and the

frame plate 100 are firmly fixed together, and the carriage 4 is electrically connected to the frame, thereby reducing noise.

5 Thus, after completing the fabrication, when the carriage 4 is mounted on the timing belt 112 and the pulse motor 7 is operated, a great force is exerted, in the carriage movement direction. However, the carriage is fixed through the projection piece 421 to the timing belt 112, thereby producing high printing quality without instability.

10 Moreover, in the illustrated embodiment, the frame plate 100 is mounted on the lower portion of the frame 40. If the frame plate 100, however, is mounted on the upper portion of the frame 40, the same functions are obviously obtained.

15 Further, in the illustrated embodiment, one of reference surfaces 423, 423' has the projection piece 421. If both reference surfaces 423, 423' have respective projection pieces, the same functions are obviously obtained.

20 Furthermore, in the illustrated embodiment, two projections 421a are provided, but if the number of projections is either one or not less than three, the same functions are obtained.

Reference is now made as how to mount members such as the pulse motor 7 or the timing belt 112 on the frame plate 100.

As shown in Figure 18, a follower pulley shaft 114 is fixed to the frame plate 100. The follower pulley 113 is rotatably mounted on the pulley shaft 114 by means of a bearing 118 made of plastics, the bearing 118 being incorporated in the pulley 113. Movement of the timing belt 112 in the axial direction is controlled by a flange 119, a plastics ring 123 and an E-shaped stopper ring 120. A driving pulley shaft 109 is fixed to the pulse motor 7 so as to extend vertically with respect to the printer body. A driving pulley 108 is rotatably mounted by means of bearing 115 on the pulley shaft 109. Movement of the timing belt 112 in the axial direction is controlled by a flange 116, a plastics ring 122, and an E-shaped stopper ring 117. The driving pulley shaft 109 is inserted in an elongated hole 106e so as to be rotatable therein. The pulse motor 7 is supported in a hole 106c of the frame plate 100 by a projection 7c which is provided around a pinion 111 so that it is rotatable therewith. A rim 7a and a rim 7b provided on the pulse motor 7 are engaged with hook-shaped projections 106a and 106b respectively of the frame plate 100, thereby preventing the pulse motor 7 from moving downwards. The timing belt 112 extends between the follower pulley 113 and the driving pulley 108. The

pulse motor 7 is urged to rotate around the projection 7c in the direction of an arrow 121 by a tension spring 110, the latter acting between a hook-shaped projection 7d of the pulse motor 7 and a hook-shaped projection 106d of the frame plate 100, thereby providing the timing belt 112 with a constant tension corresponding to the spring force and to the displacement of the tension spring 110. The driving pulley 108 is engaged with the pinion 111 which is fixed to the output shaft of the pulse motor 7, thereby transmitting the driving force of the pulse motor 7. Thus the drive transmitting mechanism which comprises the pinion 111, the driving pulley 108, and the bearing 115 or the like, transmits the driving force from the pulse motor 7 to the timing belt 112.

When the members are fabricated, the pulse motor 7 which drives the pulley shaft 109 and the pinion 111 are fixed in positions where the rims 7a and 7b do not interfere with the hook-shaped projections 106a and 106b, respectively, and thereafter the pulse motor 7 is rotated in the direction of arrow 121, thereby engaging the rims 7a and 7b with the hook shaped projections 106a and 106b so that the pulse motor 7 is fixed to the frame plate 100. Then the driving pulley 108, the plastics bearing 115, the flange 116, the plastics ring 122, and the E-shaped

ring 117 are inserted on the driving pulley shaft 109.

After mounting the timing belt 112 in position, the tension spring 110 is fitted to the frame plate 100 at one end and to the pulse motor 7 at the other end. The timing belt 112 then extends between the follower pulley 113 and the driving pulley 108 at constant tension.



CLAIMS

1. A platen assembly comprising a platen; a
paper guide plate having an inclined substantially
5 vertical surface for guiding paper to the platen, the
inclined surface leading to a curved surface whose
curvature is similar to that of the platen; and paper
controlling means for controlling the position of paper
leaving the platen, the paper controlling means having
10 at least one rib provided with first and second surfaces
which meet at a junction, each of the first and second
surfaces lying in a respective plane which is inclined
to an horizontal plane containing the axis of the
platen; the arrangement being such that paper leaving
15 the platen travels over the first surface to the
junction and then travels over the second surface and so
away from the platen.

2. A platen assembly as claimed in claim 1 in
which the paper guide plate is provided at its rear with
20 support means by means of which it is mounted on a wall
of a frame which carries the platen.

3. A platen assembly as claimed in claim 1 or 2
in which the assembly comprises bail means operable to
press the paper against the platen.

4. A platen assembly as claimed in claim 3 in
25 which the bail means comprises first and second plates
which are arranged side by side, the first plate having
a substantially lower coefficient of friction than the
second, the first plate being engageable with the paper
and the second plate being more resilient than the first
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plate and being operable to urge the latter towards the platen so as to press the paper against the platen.

5. A platen assembly as claimed in claim 4 in which the first plate is made of polymeric material, the second plate being made of metallic material.

5 6. A platen assembly as claimed in any of claims 3-5 in which the assembly comprises a printing head which is arranged on the discharge side of the bail means.

10 7. A platen assembly as claimed in any preceding claim in which the assembly comprises a pressing roller, resilient means for urging the pressing roller towards the platen, and control means for moving the pressing roller away from the platen.

15 8. A platen assembly as claimed in claim 7 when dependent upon any of claims 3-6 in which the control means is settable in first and second positions in which the pressing roller is respectively adjacent to and spaced from the platen, the control means causing the bail means to apply greater pressure to the paper when the control means is in the said first position than
20 when it is in the said second position.

25 9. A platen assembly as claimed in claim 8 in which the control means is arranged to alter the flexure of the bail means, the control means, when in the said first position, causing greater flexure of the bail means than when the control means is in the said second position.

30 10. A platen assembly as claimed in claim 1 comprising a carriage which is movable transversely of the platen and which carries a printing head; drive means for moving the carriage; drive transmitting means



for transmitting drive from said drive means to said carriage; and a resilient means which is engaged with said drive means so as to urge the latter in a direction such that the drive transmitting means is tensioned.

11. A platen assembly as claimed in claim 2 or in
5 any claim appendant thereto in which the assembly comprises a support plate which carries carriage moving means, the support plate being detachably connected to the said frame.

12. A platen assembly as claimed in claim 11 in
10 which the support plate is connected to the said frame in such a way as to take up slack therebetween.

13. A platen assembly as claimed in claim 12 in
which the said frame is provided with at least one projection which, when the support plate is attached to
15 the said frame, resiliently engages a part of the support plate so as to take up slack.

14. A platen assembly as claimed in any of claims
11-13 in which the carriage moving means comprises a belt and means for maintaining said belt at
20 substantially constant tension.

15. A platen assembly as claimed in any preceding
claim in which the paper controlling means is provided with a plurality of the said ribs.

16. A platen assembly substantially as
25 hereinbefore described with reference to and as shown in the accompanying drawings.

17. A printer provided with a platen assembly as
claimed in any preceding claim.