

APPARATUS FOR HOLDING A PRINT MATERIAL IN A PRINTER

This invention relates to apparatus for holding a print material, and particularly, although not exclusively
5 for holding paper in a printer.

In general, a conventional video printer for example, a conventional colour printer, uses a three-colour ribbon in order to represent a full range of
10 colours of a video signal. The three-colour ribbon is generally divided into a number of parts each having colour components of Yellow, Magenta and Cyan and a number of separation strips, for separating the parts from each other.

15 A known colour video printer which employs a three-colour ribbon to print full colours of the video signal, sequentially rotates a length of paper three times, with the paper being held fixedly on the surface of a platen drum, the three-colour ribbon being placed
20 between the paper and a thermal head. In order to freely represent entire gradations of the colours, the video printer controls the thermal sublimation (radiation) of the ribbon. In this method of reproducing a video signal,
25 the paper needs to be rotated fixedly in place on the platen drum of the video printer. For this purpose, the video printer generally requires a paper holding apparatus.

30 Figure 1 illustrates a schematic view showing the operation of a paper holding apparatus and a platen drum in a conventional video printer;

Figure 2 illustrates a perspective view of a sublimation colour ribbon and a ribbon cartridge therefor used in a colour video printer; and

5 Figure 3 illustrates a head on view of the conventional video printer of Figure 1, having a partial cross sectional view of a paper holding apparatus and a platen drum taken along the line A-A', during a raised operation of a thermal head.

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As roughly illustrated in Figures 1, 2 and 3, of the accompanying drawings a video printer having a conventional paper holding apparatus includes a platen drum 52 for rotating a length of paper 51, a paper holding apparatus 53 for fixedly holding the paper 51 on the surface of the platen drum 52, a colour ribbon 61, a ribbon cartridge 60 and a thermal head 54 for controlling the thermal sublimation of the colour ribbon 61.

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Referring to Figure 3 of the accompanying drawings, there is shown a cross sectional view along the line A-A' of Figure 1, taken at a position where the paper holding apparatus 53 passes under the thermal head 54. In operation, the thermal head 54 rises periodically in order to avoid collision with the paper holding apparatus 53 while printing. The paper 51 which is held on the surface of the platen drum 52 by means of the paper holding apparatus 53 is rotated three times sequentially so as to reproduce a complete video image. For each periodic rotational movement of the platen drum 52, the thermal head 54 makes an up/down movement, in an upward/downward direction as show in Figures 1 and 3.

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Therefore, with the conventional paper holding apparatus described hereinabove, the video printer takes a long time in printing because of the up/down movement of the thermal head 54. Additionally, the video printer
5 requires a control circuit and control mechanism for controlling the up/down movement of the thermal head. Furthermore, the precision of printing an image is undesirably reduced because of the up/down movement of the thermal head.

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In the above described conventional video printer, the colour ribbon 61 is of a length which accommodates passage of the paper holding apparatus under the thermal head 54, and undesirable wastage of the colour ribbon is
15 therefore obtained.

According to one aspect of the present invention there is provided an apparatus for clamping an elongate print-receiving material to a platen of a printer for
20 transport past a print head, said apparatus comprising clamping means disposed only adjacent to at least one marginal side edge portion of a material receiving surface of said platen, said clamping means being arranged to urge one or more edge regions of said material towards said
25 surface of said platen, whereby the transport of said material past said print head is substantially unobstructed by said clamping means.

Preferably said clamping means comprises at least one
30 member having a part which acts in a direction substantially perpendicular to said surface, said material being arranged to pass between said part and said surface.

Preferably said member is a plate arranged
35 substantially perpendicular to said material contacting

surface, said part being a piece of the member which is angled to a main body of said plate.

5 Preferably the apparatus further comprises means for operating said member to hold or release said material to or from said surface.

10 Preferably said member operating means is a lever connected to said member, for operation thereof.

15 Preferably said platen is a platen drum.

20 Preferably said member operating means is activated by an activating mechanism to operate said member in response to rotation of said platen drum.

25 Said activating mechanism may activate to release said print material upon every third rotation of the print material around the platen drum.

30 Preferably said activating mechanism includes a push-rod arrangement for activation of said operating means.

35 Preferably said activating mechanism further includes resilient means for operating said member to hold said material to the surface.

Preferably said resilient means is a spring.

40 The invention includes apparatus having first and second said clamping means arranged respectively at first and second marginal side edge portions of the surface of said platen, said first and second marginal side edge portions being at opposite sides of the material to each other and having an expanse of said material therebetween.

A thermal print head may be arranged between said first and second means over said expanse of material.

Said material may be paper.

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Reference will now be made, by way of example, to the accompanying diagrammatic drawings, in which:

Figure 4 illustrates an exploded view of a print material holding apparatus, according to a preferred embodiment of the present invention; and

Figure 5 illustrates a cross sectional view of the apparatus taken along a line B-B' shown in Figure 4.

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Referring to Figures 4 and 5 of the accompanying drawings, print material holding members 3 are each mounted at a corresponding end of a platen drum 10 and are fixed with a stiffening bar 11 which is placed within the platen drum 10 along side a central axis of the platen drum 10. The respective print material holding members 3 are each folded at one end of the member by substantially 90 degrees, such that a surface of each folded end substantially faces the outermost surface of the platen drum 10. The print material holding members 3 essentially hold a length of print material 2 fixedly upon the outermost surface of the platen drum 10.

The print material is referred to hereafter as being paper, although it is understood that the invention is not restricted to such material.

In addition, the respective print material holding members 3 each have an opening 31 which is formed in an elongate slot shape aligned towards the upper end of the

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members 3. A pair of guide openings 5 are formed at a specific distance from each end of the opening 31. The guide openings 5 are movably coupled to a pair of guide pins 22 which extend through the platen drum 10 with the stiffening bar 11 so as to assist the print material holding members 3 to move up and down with respect to the platen drum 10.

The following description refers to the exploded assembly shown in Figure 4, on one side of the platen drum 10, but it is to be understood that a corresponding similar assembly is provided on the other side of the platen drum also, as shown in Figure 5 of the accompanying drawings. At an end of the print material holding members 3 shown in Figure 1 of the drawings, perpendicularly to a length of the openings 31, a pin 15 is provided which locates with an L-shaped plate 7 by being inserted in to an opening 9 in the L-shaped plate. Opposite to the pin 15, a spring holder 6 is formed on the stiffening bar 11 for supporting an end 4a of a spring 4. The spring 4 of which another end 4b is held on a spring holding pin 8, pivots the print material holding member 3 about the opening 31.

The L-shaped plate 7 has a clearance-hole 13 formed in proximity of a curve in the plate, and a spring holding pin 8. The clearance-hole 13 is rotatably coupled to a central axle 12. The spring holding pin 8 has two specific functions; One is to hold the end 4b of the spring 4, and another is to pivot the L-shaped plate 7 about the axle 12 when it is pushed by means of a push-rod 17 which operates on every third rotation of the platen drum 10.

An E-shaped ring 20 is rotatably fitted with a groove 14 formed around an end of the central axis 12, for retaining the spring 4, and L-shaped plate 7, onto the axle 12 and in contact with the paper holding member 3.
5 The platen drum 10, paper holding members 3, axle 12 and L-shaped plate 7 are mounted in a chassis 80.

In operation, when the paper 2 is loaded onto the platen drum 10, the push-rod, 17 pushes the spring holder
10 8 in the direction of the arrow in order to pivot the L-shaped plate 7 upon the clearance-hole 13. Meanwhile, since the L-shaped plate 7 is fixed to the print material holding member 3 through the opening 9 which is coupled to the pin 15, the L-shaped plate 7 acts as a lever on the
15 print material holding member 3 which presses down the paper 2 upon the outermost surface of the platen drum 10.

The guide pins 22 assure that when a rotational force is applied to the print material holding member 3 through
20 the pin 15, the print material holding member 1 moves along the guide openings 5 so as to guide the print material holding member 1 only upwardly or downwardly. It is necessary for the opening 31 and the guide openings 5 to be long enough to allow for the print
25 material holding member 3 to slide up and down enough to hold and release the paper 2 onto the drum 10. The print material holding member 3 can move upwards high enough to load the paper 2 on the video printer. Additionally, when the paper is loaded, the opening 31 and guide openings 5
30 are long enough so that the press-down member 3 can fixedly hold the paper 2 on the platen drum 10.

Since the L-shaped spring 4 acts to force the print material holding member 3 in a direction which
35 presses down the paper 2, the paper can be properly fixed

on the platen drum 10. However, after three rotations of a preceding paper, the push-rod 17 will push the spring holder 8 in a direction of the arrow to activate the print material holding member 3 to move upwardly, as shown in the drawing, and to release the paper 2.

It is noted that the print material holding members hold only the edges of the paper 2. Therefore, the thermal head 74 does not need to move up and down. In addition, because the up/down movement of the thermal head 74 can be eliminated, the width of the separation strip 62 of the colour ribbon can be minimized, saving space in the surface of the colour ribbon, and the printing speed is improved relatively.

Another advantage of the illustrated video printer is that, since a control device and control mechanism for controlling the up/down movement of the thermal head, is not necessary, the printer can be manufactured in a small size.

While the invention has been particularly shown and described with reference to a preferred embodiment, it will be understood by those skilled in the art that modifications in detail may be made without departing from the scope of the invention.

Preferred embodiments of the present invention have the advantage that by provision of a print material holding apparatus having holding members mounted at each end of a platen drum, a printer is able to print signals on elongate material with increased speed owing to removal of necessity for a thermal head to make an up/down movement with respect to the material.

Preferred embodiments of the present invention have the advantage that in a video printer, a paper holding apparatus which does not involve a substantial upward or downward movement of a thermal head is provided.

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Eliminating an upward/downward movement of a thermal head also has an advantage of reducing the printing time of a video image and/or signal.

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Owing to an elimination or reduction of a movement of a thermal head, a length of ribbon of a colour printer may be fully utilised for print, without wastage, or with reduced wastage, of the ribbon.

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Furthermore, reduction of mechanical movement of a thermal head in a colour printer results in potentially higher resolution and/or precision of printing, as print quality is not disturbed.

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Elimination of a control circuit and/or associated control mechanism for moving a thermal head potentially enables the provision of more compact colour video printers.

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CLAIMS:

1. An apparatus for clamping an elongate print-receiving material to a platen of a printer for transport past a print head, said apparatus comprising clamping means
5 disposed only adjacent to at least one marginal side edge portion of a material receiving surface of said platen, said clamping means being arranged to urge one or more edge regions of said material towards said surface of said platen, whereby the transport of said material past said
10 print head is substantially unobstructed by said clamping means.
2. An apparatus according to claim 1, wherein said
15 clamping means comprises at least one member having a part which acts in a direction substantially perpendicular to said surface, said material being arranged to pass between said part and said surface.
3. Apparatus according to claim 2, in which said member
20 is a plate arranged substantially perpendicular to said material receiving surface, said part being a piece of the member which is angled to a main body of said plate.
4. Apparatus according to any one of the preceding
25 claims, further comprising means for operating said member to hold or release said material to or from said surface.
5. Apparatus according to claim 4, wherein said means
30 for operating said member is a lever connected to said member, for operation thereof.
6. Apparatus according to any one of the preceding claims wherein said platen is a platen drum.



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7. Apparatus according to claim 6, wherein said member operating means is activated by an activating mechanism to operate said member in response to rotation of said platen drum.

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8. Apparatus according to claim 7, wherein said activating mechanism activates to release said print material upon every third rotation of the print material around the platen drum.

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9. Apparatus according to claim 8, wherein said activating mechanism includes a push-rod arrangement for activation of said operating means.

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10. Apparatus according to any one of claims 7, 8 or 9, wherein said activating mechanism further includes resilient means for operating said member to hold said material to the surface.

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11. Apparatus according to claim 10, wherein said resilient means is a spring.

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12. Apparatus according to any one of the preceding claims, having first and second said clamping means arranged respectively at first and second marginal side edge portions of the surface of said platen, said first and second marginal side edge portions being at opposite sides of the material to each other and having an expanse of said material therebetween.

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13. Apparatus according to claim 12 wherein a thermal print head is arranged between said first and second clamping means over said expanse of material.



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14. Apparatus according to any one of the preceding claims in which said material is paper.

15. Apparatus or means for holding a print material,
5 substantially as hereinbefore described with reference to
Figures 4 and 5 of the accompanying drawings.
