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PAGER WITH BUILT-IN PRINTER**FIELD OF THE INVENTION**

The following invention relates to pager technology. More particularly, though not exclusively, the invention relates to a pager having a built-in printer. Such a printer might be a drop-on-demand inkjet printer
 5 utilizing a fixed printhead system.

BACKGROUND

Known pagers have a display panel upon which messages are displayed. However, no means of conveniently producing a print-out of the message is heretofore known.

The mere incorporation into a pager housing of a known printer device would not result in a
 10 compact, easily portable pager. This is because prior art printers incorporate a supply of print media and employ a print media feed mechanism to transport the print media past the printheads to effect printing onto the print media. Such known printers, having a supply of print media, are large and heavier than would be desirable in a portable pager.

CO-PENDING APPLICATIONS

15 Various methods, systems and apparatus relating to the present invention are disclosed in the following co-pending applications filed by the applicant or assignee of the present invention simultaneously with the present application:

20	AP39	AP43	AP44	AP46	AP47	AP48
	AP49	AP50	AP51	AP52	AP53	AP55
	AP58	AP60	AP61	AP62	AP63	AP64
	AP65	AP66	AP67	AP68	AP69	AP70
	AP71	AP77	AP78	AP79		

The disclosures of these co-pending applications are incorporated herein by cross-reference. Each application is temporarily identified by its file reference. This will be replaced by the corresponding PCT
 25 Application Number when available.

RELATED PATENT APPLICATIONS AND PATENTS

	US6,227,652	US6,213,588	US6,213,589	US6,231,163
	US6,247,795	US6,394,581	US6,244,691	US6,257,704
30	US6,416,168	US6,220,694	US6,257,705	US6,247,794
	US6,234,610	US6,247,793	US6,264,306	US6,241,342
	US6,247,792	US6,264,307	US6,254,220	US6,234,611
	US6,302,528	US6,283,582	US6,239,821	US6,338,547
	US6,247,796	US09/113,122	US6,390,603	US6,362,843
35	US6,293,653	US6,312,107	US6,227,653	US6,234,609
	US6,238,040	US6,188,415	US6,227,654	US6,209,989
	US6,247,791	US6,336,710	US6,217,153	US6,416,167
	US6,243,113	US6,283,581	US6,247,790	US6,260,953
	US6,267,469	US6,273,544	US6,309,048	US6,420,196

	US6,443,558	US09/422,892	US6,378,989	US09/425,420
	US09/422,893	US09/609,140	US6,409,323	US6,281,912
	US09/575,113	US6,318,920	US6,488,422	US09/693,644
	US6,457,810	US6,485,135	US09/112,763	US6,331,946
5	US6,246,970	US6,442,525	US09/505,951	US09/505,147
	US09/505,952	US09/575,108	US09/575,109	US09/575,110
	US09/607,985	US6,398,332	US6,394,573	US09/606,999
	US6,238,044	US6,425,661	US6,390,605	US6,322,195
	US09/504,221	US6,480,089	US6,460,778	US6,305,788
10	US6,426,014	US6,364,453	US6,457,795	US09/556,219
	US09/556,218	US6,315,399	US6,338,548	US09/575,190
	US6,328,431	US6,328,425	US09/575,127	US6,383,833
	US6,464,332	US6,390,591	US09/575,152	US6,328,417
	US6,322,194	US09/575,177	US09/575,175	US6,417,757
15	US09/608,780	US6,428,139	US09/607,498	US09/693,079
	US09/693,135	US6,428,142	US09/692,813	US09/693,319
	US09/693,311	US6,439,908	US09/693,735	PCT/AU98/00550
	PCT/AU00/00516	PCT/AU00/00517	PCT/AU00/00511	PCT/AU00/00754
	PCT/AU00/00755	PCT/AU00/00756	PCT/AU00/00757	PCT/AU00/00095
20	PCT/AU00/00172	PCT/AU00/00338	PCT/AU00/00339	PCT/AU00/00340
	PCT/AU00/00341	PCT/AU00/00581	PCT/AU00/00580	PCT/AU00/00582
	PCT/AU00/00587	PCT/AU00/00588	PCT/AU00/00589	PCT/AU00/00583
	PCT/AU00/00593	PCT/AU00/00590	PCT/AU00/00591	PCT/AU00/00592
	PCT/AU00/00584	PCT/AU00/00585	PCT/AU00/00586	PCT/AU00/00749
25	PCT/AU00/00750	PCT/AU00/00751	PCT/AU00/00752	PCT/AU01/01332
	PCT/AU01/01318	PCT/AU00/01513	PCT/AU00/01514	PCT/AU00/01515
	PCT/AU00/01516	PCT/AU00/01517	PCT/AU00/01512	PCT/AU01/00502
	PCT/AU02/01120	PCT/AU00/00333	PCT/AU01/00141	PCT/AU01/00139
	PCT/AU01/00140	PCT/AU00/00753	PCT/AU01/01321	PCT/AU01/01322
30	PCT/AU01/01323	PCT/AU00/00594	PCT/AU00/00595	PCT/AU00/00596
	PCT/AU00/00597	PCT/AU00/00598	PCT/AU00/00741	PCT/AU00/00742

DISCLOSURE OF THE INVENTION

According to one aspect of the present invention there is disclosed a pager comprising:

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a housing;

a digital storage device adapted to store one or both of text and image data received by the pager via radio communication;

a sweep printer located within the housing and configured to:

- (a) receive digital information from the digital storage device; and
- (b) print one or both of text and an image on print media external to the sweep printer as the housing traverses said print media.

5 Preferably, the pager further comprises an antenna via which one or both of said text data and said image data is received.

Preferably, said printer comprises a drop-on-demand color inkjet printhead.

Preferably, the housing has located therein a replaceable ink cartridge communicating with the printhead.

10 Preferably, the pager has located within the housing a speed sensor including an optical encoder wheel adapted to contact the print media and to rotate as the housing traverses the print media, said optical encoder wheel including a series of circumferential spaced markings thereon, the speed sensor further including an optical sensor for detecting the markings as said markings pass the optical sensor during rotation of the optical encoder wheel.

15 Preferably, the circumferential spacing between successive markings on the optical encoder wheel is substantially equal to the spacing between successive print lines in at least one of the text and the image being printed by the printhead.

Preferably, detection of a marking on said encoder wheel by the optical sensor triggers the printing of a next line of one or both of text data and image data.

20 Preferably, the pager further includes a power supply located within said housing. More preferably, the power supply includes a battery removable from the pager.

Preferably, the pager further comprises a display screen adapted to display one or both of the text and the image.

Preferably, the pager further comprises user operable buttons for controlling said printer.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred form of the present invention will now be described by way of example only with reference to the accompanying drawings, wherein:

Figure 1 is a schematic perspective illustration of a pager having a built-in printer, in use traversing a page to print an image thereon;

Figure 2 is a schematic perspective view of a pager;

Figure 3 is a schematic inverted perspective view of the pager of Figure 2;

Figure 4 is a schematic exploded perspective view of the pager of Figs 2 and 3;

Figure 5 is a schematic plan view of the pager;

Figure 6 is a schematic side elevational view of the pager;

Figure 7 is a schematic front elevational view of the pager;

Figure 8 is a schematic inverted plan view of the pager; and

Figure 9 is a schematic perspective view of the pager with a back cover removed.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In Figure 1 of the accompanying drawings there is schematically depicted a pager 10 having a built-in printer, having almost completely traversed a page of print media 12 to print an image 11 thereon. The pager 10 is a hand-held device that is sized and shaped to fit easily within the pocket or purse, for example, of a user.

As shown in Figure 2, the housing of pager 10 includes a plastics top molding 13 and a base molding 14. The top molding 13 has a display window 23, a pair of scroll buttons 21, a YES/GO button 15 and a NO/STOP button 16.

At the bottom edge of the housing of the pager 10 there is provided an optical encoder wheel 18, an idler wheel 20 and a printhead 19 therebetween. Operation of the printhead, the optical encoder wheel and associated internal componentry can be found in our co-pending application (docket AP46) entitled "Manually Operable Printer-Scanner". Although the printing mechanism utilized in the present invention might be identical to that disclosed in the co-pending application (docket AP46), other forms of small, lightweight printers (yet to be developed) that can print on print media external to the pager housing 10 can be employed.

As shown in Figure 3, the base molding 14 has associated therewith a battery/ink cartridge cover molding 17. This would typically reside alongside the printhead 11 as shown.

An exploded perspective view of the pager is shown in Figure 4. Beneath the top molding 13, there is provided an elastomeric button molding 22 to cover the electrical switches of the scroll buttons 21, the YES/GO button 15 and the NO/STOP button 16.

Situated beneath the display window 23, there is provided a liquid crystal display (LCD) 24. LCD 24 is attached to a printed circuit board 25 behind which there is located electronics 29. Power to the printed circuit board 25 and LCD 24 is from a battery 30 via battery contacts 28. Battery 30 might typically be an AAA sized battery. The battery might typically be rechargeable.

5 Also located within the pager housing and associated with the printhead 19 is a flexible printed circuit board 27 which contacts with the printed circuit board 25 to provide control signals and power to the printhead 19.

Also associated with the printhead 19 is an ink connector 26 to receive ink from an ink cartridge 32. A question/answer (QA) chip 31 on the ink cartridge 32 makes contact with the underside of ink connector 26 to indicate that the cartridge is present. If the cartridge is absent, a display warning might be sent to the LCD 24.

10 Details of the electronics 29 can be better seen in Figure 9. That is, attached to the underside of PCB 25 is a printer chip 35 serving to the control the operation of the printhead 19 and perhaps to store digital image data to be printed. However, the digital data might be stored on another chip or chips or might be stored on a memory card or other storage unit. The flex PCB 27 is shown attached to PCB 25 in this figure. A coin battery 36 such as a lithium ion battery is also attached to the PCB 25. This might serve to maintain any memory data when the main battery 30 is removed or drained. An antenna 37 associated with the pager unit is also depicted. Also associated with the pager unit is a vibrating magnet 33 and a speaker 34. Features 33, 34 and 37 will not be described in detail as they can be standard pager components.

20 In use, the pager unit receives messages via the antenna 37 whereupon the speaker 34 makes a tone and/or the vibrating magnet 33 vibrates the pager to indicate that a message has been received. The message can be viewed through the display window 23 upon manipulation of buttons 21. Software controlling the LCD can display a print option whereupon the YES/GO button 15 can be depressed to initiate a printing mode, or the NO/STOP button 16 can be pressed if a print-out is not required.

25 Apart from text messages, the pager might receive a graphic image. Text and/or a graphic image can be printed upon the sheet of print media 12 by grasping the pager unit 10 and rolling it across the page with optical encoder wheel 18 and idler wheel 20 in contact therewith. When the unit is drawn across the page, the printhead 19 deposits droplets of ink upon the page to produce the image 11. The image 11 can be monochrome or color, depending on the type of printhead employed and the configuration of the ink cartridge and ink delivery means. For color printing, multiple-color inks can be employed and the printhead of cross-referenced application AP46 can be employed.

WE CLAIM:

1. A pager comprising:

a housing;

5 a digital storage device adapted to store one or both of text and image data received by the pager via radio communication;

a sweep printer located within the housing and configured to:

(a) receive digital information from the digital storage device; and

(b) print one or both of text and an image on print media external to the sweep printer as the housing traverses said print media;

10 the pager further including a speed sensor including an optical encoder wheel projecting from said housing and configured to engage the print media as the digital camera traverses the print media in the printing orientation; wherein the printing speed is dependent on the speed measured by said speed sensor.

15 2. The pager of claim 1 further comprising an antenna via which one or both of said text data and said image data is received.

3. The pager of claim 1 wherein said printer comprises a drop-on-demand color inkjet printhead.

20 4. The pager of claim 3 wherein the housing has located therein a replaceable ink cartridge communicating with the printhead.

25 5. The pager of claim 1 wherein said optical encoder wheel includes a series of circumferential spaced markings thereon, the speed sensor further including an optical sensor for detecting the markings as said markings pass the optical sensor during rotation of the optical encoder wheel.

6. The pager according to claim 5 wherein the circumferential spacing between successive markings on the optical encoder wheel is substantially equal to the spacing between successive print lines in at least one of the text and the image being printed by the printhead.

30 7. The pager of claim 5 wherein detection of a marking on said encoder wheel by the optical sensor triggers the printing of a next line of one or both of text data and image data.

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8. The pager of claim 1 further including a power supply located within said housing.

9. The pager of claim 8 wherein the power supply includes a battery removable from the pager.

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10. The pager according to claim 1 further comprising a display screen adapted to display one or both of the text and the image.

11. The pager according to claim 1 further comprising user operable buttons for controlling said printer.

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