The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 27

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte GOPALAN RAMAN and CHARLES R. STEINMETZ

Appeal No. 2001-1773
Application No. 08/732,864

ON BRIEF[1]

Before HAIRSTON, FLEMING, and LEVY, Administrative Patent Judges.
LEVY, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1-11, which are all of the claims pending in this application.

[1] The Oral Hearing scheduled for November 7, 2001 was waived by appellants in a communication received, via facsimile, on October 3, 2001.

BACKGROUND

Appellants' invention relates to a method and apparatus for drop weight encoding. An understanding of the invention can be derived from a reading of exemplary claim 1, which is reproduced as follows:

1. An inkjet print cartridge for use in an inkjet printing apparatus for forming images on print media, the inkjet print cartridge comprising:

a pen body;

an inkjet printhead mounted to the pen body for ejecting ink drops onto print media, the inkjet printhead having a manufacturing tolerance associated therewith and producing a corresponding actual drop weight for said printhead which is dependent on the manufacturing tolerance in a range of drop weights; and

an information storage device supported by the pen body and associated with the inkjet printhead for storing information for identifying said corresponding actual drop weight for said printhead, said information readable by the inkjet printing apparatus.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Watrobski et al. (Watrobski)	5,504,507	Apr. 2, 1996 (effectively filed Oct. 8, 1992)
Bullock et al. (Bullock)	5,699,091	Dec. 16, 1997 (filed Jan. 8, 1996)

Claims 1-11 stand rejected under 35 U.S.C. § 103 as being unpatentable over Bullock in view of Watrobski.

Rather than reiterate the conflicting viewpoints advanced by the examiner and appellants regarding the above-noted rejection, we make reference to the examiner's answer (Paper No. 19, mailed October 26, 1999) for the examiner's complete reasoning in support of the rejection, and to appellants' brief (Paper No. 16, filed September 7, 1999) and reply brief (Paper No. 21, filed January 3, 2000) for appellants' arguments thereagainst. Only those arguments actually made by appellants have been considered in this decision. Arguments which appellants could have made but chose not to make in the brief have not been considered. See 37 CFR 1.192(a).

OPINION

In reaching our decision in this appeal, we have carefully considered the subject matter on appeal, the rejection advanced by the examiner, and the evidence of obviousness relied upon by the examiner as support for the rejection. We have, likewise, reviewed and taken into consideration, in reaching our decision, appellants' arguments set forth in the briefs along with the examiner's rationale in support of the rejection and arguments in rebuttal set forth in the examiner's answer.

It is our view, after consideration of the record before us, that the evidence relied upon and the level of skill in the particular art would not have suggested to one of ordinary skill in the art the invention as set forth in claims 1-11. Accordingly, we reverse.

In rejecting claims under 35 U.S.C. § 103, it is incumbent upon the examiner to establish a factual basis to support the legal conclusion of obviousness. See In re Fine, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the examiner is expected to make the factual determinations set forth in Graham v. John Deere Co., 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), and to provide a reason why one having ordinary skill in the pertinent art would have been led to modify the prior art or to combine prior art references to arrive at the claimed invention. Such reason must stem from some teaching, suggestion or implication in the prior art as a whole or knowledge generally available to one having ordinary skill in the art. Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 1051, 5 USPQ2d 1434, 1438 (Fed. Cir. 1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 293, 227 USPQ 657, 664 (Fed. Cir. 1985); ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). These showings

by the examiner are an essential part of complying with the burden of presenting a prima facie case of obviousness. Note In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). If that burden is met, the burden then shifts to the applicant to overcome the prima facie case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole. See id.; In re Hedges, 783 F.2d 1038, 1039, 228 USPQ 685, 686 (Fed. Cir. 1986); In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984); and In re Rinehart, 531 F.2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976).

We begin with claim 1. The examiner's position (answer, pages 3 and 4) is that "Bullock et al. does not disclose that the information storage device is a circuit having a resistance value corresponding to the information stored therein, or that the storage device comprises a resistive network to provide a selected resistance between a pair of terminals, the pair of terminals configured for engagement with corresponding printer terminals." To make up for this deficiency in Bullock, the examiner (answer, page 4) turns to Watrobski for a teaching of "an inkjet printhead having an information storage device comprising a circuit (60a, 64, 62, 60b) having a resistance value corresponding to the information stored therein, and that the

information storage device comprises a resistive network to provide a selected resistance between a pair of terminals (60a, 60b), the pair of terminals configured for engagement with corresponding printer terminals." In the examiner's opinion (id.) the modification of Bullock in view of Watrobski would have been obvious in order to provide a provision for recognizing variations in the performance characteristics of individual chips and be able to compensate for these variations.

Appellants assert (brief, page 8) that cartridge 60 of Bullock does not include the printhead, which is carried by separate structure, the ink jet pen 82. Appellants assert (brief, pages 8 and 9) that cartridge 60 interconnects with a receptacle 66, which in turn is fluidically connected to ink jet pen 82 via conduit 84, and that Bullock therefore does not teach or suggest a print cartridge including a pen body, a printhead mounted to the pen body, and having a manufacturing tolerance associated therewith. It is further argued (brief, page 9) that "Bullock does not describe, with respect to Claim 1, 'an information storage device ... associated with the inkjet printhead for storing information for identifying said corresponding actual drop weight for said printhead, said information readable by the inkjet printing apparatus'."

Moreover, appellants assert (brief, pages 9 and 10) that after the ink supply in cartridge 60 is used, the printer may calculate a drop volume size, based upon the number of drops emitted and the nominal supply size, which is in contrast with the claimed invention where the actual drop volume is encoded in the information storage device, so that the printer can immediately make use of this information without having to rely upon conservative estimates and subsequent calculations.

Turning to Watrobski, appellants argue that Watrobski does not make up for the deficiencies of Bullock because even if memory chip 76 of Bullock is replaced with a resistor network, the claimed invention would not result because firstly, the memory chip 76 of Bullock is not supported by a pen body. Secondly, Watrobski does not teach identifying the corresponding actual drop weight for the printhead.

In response, the examiner presents three arguments (answer, pages 5 and 6). Firstly, the examiner asserts that the portion of Bullock (col. 3, lines 56-67) which states that engineering changes to the printer can be corrected without having to provide revised printer drivers to users by inserting the revised parameters into the memory chip 76 of an ink cartridge, suggests that the revised parameters can include drop volume coefficients,

which are equivalent to drop weight parameters. Secondly, the examiner asserts (answer, page 5) that "Watrobski suggests a printhead which has an information storage device for storing information for identifying corresponding actual spot size due to manufacturing tolerances. The actual spot size is directly correlated to the actual drop weight ejected." Thus, the examiner finds that Watrobski suggests an information storage device for storing the actual drop weight of the printhead. Thirdly, the examiner asserts that it is well within the skill of one of ordinary skill in the art to either make the cartridge 60 integral with printhead 82 or to rearrange the information storage device 76 into the printhead 82.

We find that Bullock discloses copiers, printers and plotters that include a replaceable microprocessor that includes an internal memory for storing usage, calibration and other data (col. 1, lines 11-22). Thermal ink jet printheads employ a heater resistor at each orifice for causing the ejection of ink drops. The amount of current applied to a heater resistor to achieve a desired ink drop volume is determined by a number of factors and is the product of a calculated algorithm. Drop volume is dependent upon sensed temperature, the ink's characteristics, the structure of the ink orifice, etc. These

parameters are provided to the inkjet printer by the printer driver, upon power up (col. 2, lines 29-41). If it is determined by the manufacturer that the parameters require modification, the manufacturer must issue a printer driver update and supply the update to previous and current customers (col. 2, lines 42-45). Bullock discloses in the summary of the invention that the apparatus is adapted to receive a replacement ink cartridge that enables a direct substitution of the memory without requiring changes to the interface between the cartridge and the connectors which mate the cartridge with the apparatus (col. 3, lines 25-41). Referring to figures 4 and 5, ink jet print cartridge 60 includes an internal reservoir 62. Receptacle 66 receives ink from cartridge 60. A serial memory chip 76 enables input/output of data over a single access wire. Keying features 80 on cartridge 60 mate with keying features on receptacle 66. Receptacle 66 is fluidically connected to an ink jet pen 82 via a conduit 84. Microprocessor 86 controls operation of the ink jet printer, in accordance with various parameters derived from a printer driver (col. 6, lines 5-27). Parameters include an algorithm which enables the amount of ink used and remaining to be determined (col. 6, lines 26-38). The parameter controlling prewarm current enables control of drop volume variations which

cause a variation in print quality to be avoided (col. 6, lines 41-45). Bullock further discloses (col. 6, line 56 through col. 7, line 3) that if alteration to parameters or modification of an algorithm is required as a result of an engineering change, the revised parmeters can be inserted into memory chip 76 upon manufacture of ink cartridge 60, achieving an udating of the printer without special efforts to distribute modified printer drivers. The parameter date contained in the memory chip 76 may include the actual count of drops emitted from the cartridge, drop count from the print head, cartridge usage information, etc. (col. 7, lines 4-11). From the data inputted, microprocessor 86 calculates an <u>estimate</u> of remaining ink in the cartridge 60 (col. 7, lines 14 and 15). Before starting a print job, the printer will read the supply size from the ink cartridge and compare the read parameters with an <u>estimate</u> of the amount of ink consumed (col. 7, lines 34-36). The first time a cartridge is used, the printer will have to <u>assume</u> a conservative (large) value for the drop volume (col. 7, lines 37-40). When the supply is actually empty, the printer recalculates the drop volume. In this way, the printer "learns" and becomes more accurate at drop counting (col. 7, lines 44-47). As printing progresses, microprocessor 86

employs the drop volume coefficients, drop count and temperature measurements to estimate ink usage (col. 8, lines 40-42).

From the disclosure of Bullock, we agree with appellants that Bullock does not disclose either "an inkjet printhead mounted to the pen body" or "identifying said corresponding actual drop weight for said printhead" as required by claim 1. Although we find that Bullock discloses estimating the drop volume to determine the amount of ink remaining in the cartridge, we find no teaching or suggestion of identifying the actual drop weight.

Watrobski is directed to a control system for a thermal ink jet printer (col. 1, lines 11 and 12). Watrobski recognizes the importance of having uniform spot size from each of the ejectors (col. 1, lines 62-67), and discloses an electronically readable medium capable of storing a value having a symbolic relationship to a performance characteristic of the printhead (col. 2, lines 65-67). Figure 6 is a prior art view of a linear array of 128 ejectors spaced 300 to the inch. The silicon module defining the 128 ejectors is known as a chip (col. 3, lines 38-46). On one portion of chip 50 are sense pads 60a and 60b, which are provided as terminals. Between the sense pads is an area of resistivity 62 which provides a desired resistance between the sense pads.

The amount of resistance can be processed by the printing apparatus as a symbolic representation of certain performance data associated with printhead 50, which may be the mean or minimum resistance of heating elements 26 (col. 5, line 52 through col. 6, line 17). To obtain a desired amount of resistance in the area of resistivity 62, there is provided a trim area which is created as the result of removing a predetermined amount of polycrystalline silicon, such as by means of a laser (col. 6, lines 18-23). Thus, when a chip 50 is freshly manufactured, necessary tests may be performed on each chip, and the desired resistance value may be created (col. 6, lines 30-35).

From the disclosure of Watrobski we agree with the examiner (answer, page 4) that Watrobski's area of resistivity 62, between terminals 60a and 60b is a resistive network. However, we find the examiner's reliance (answer, page 5) upon In re Japikse and In re Larson to be misplaced. While at times it may be within the level of skill to rearrange parts or to make separate parts integral, there must be a suggestion in the prior art for the proposed modification. From our review of Bullock and Watrobski, we find no suggestion, and none has been provided by the examiner, that would have suggested to an artisan that the

separate inkjet printhead of Bullock be mounted to the pen body. The examiner's conclusionary statement that the modification would have been obvious as a rearrangement of parts, or making integral what is separate, is not a substitute for evidence. Because we find no reason to modify the ink cartridge of Bullock in view of the semiconductor chip array of Watrobski, we find that the prior art does not suggest "an inkjet printhead mounted to the pen body" as recited in claim 1. Moreover, because Bullock only estimates the drop volume, and Watrobski provides uniform spot size, from which drop weight can only be inferred[2], we find that neither Bullock nor Watrobski teaches or suggests "identifying said corresponding actual drop weight for said printhead" as required by claim 1.

From all of the above, we find that the examiner has failed to establish a prima facie case of obviousness of claim 1. The rejection of claim 1, and claims 2-4 and 11, dependent therefrom, is reversed. Because each of the remaining independent claims recites either or both of an inkjet printhead mounted to the pen body or identifying said corresponding actual drop weight for said printhead, the rejection of claims 5-10 under 35 U.S.C. § 103(a) is also reversed.

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[2] Specification, page 9.

CONCLUSION

To summarize, the decision of the examiner to reject claims 1-11 under 35 U.S.C. § 103(a) is reversed.

REVERSED

KENNETH W. HAIRSTON Administrative Patent Judge	)	
MICHAEL R. FLEMING Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
STUART S. LEVY Administrative Patent Judge	)	

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