

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.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. 34

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte HIDEKI SAWADA
and
HIROMI OGATA

Appeal No. 1999-1123
Application No. 08/576,915

HEARD: MAY 23, 2001

Before HAIRSTON, GROSS, and BLANKENSHIP, Administrative Patent Judges.

HAIRSTON, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 9 through 16.

The disclosed invention relates to a control circuit for

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controlling a current that drives a printer with a LED print head that has a plurality of printing dots. The control circuit includes a set of transistors that are connected together to produce the drive current at an output summing node. A correction data signal is applied to the transistors to control the on and off states of the transistors, and a gradation data signal is applied to the sources of the transistors. The signals are combined to form the drive current for the LED print head.

Claim 9 is illustrative of the claimed invention, and it reads as follows:

9. A current control circuit for controlling a current for driving a print head having a plurality of printing dots, said current control circuit comprising:

at least one set of n output transistors, each outputting a driving current, outputs of said n output transistors being connected together at a summing node, and wherein said driving current from said n output transistors is summed at said summing node to produce a driving current for one printing dot of said plurality of printing dots;

at least one n -bit register, storing n bits of correction data for the one printing dot and having n outputs connected to said n output transistors to control ON or OFF states of said n output transistors;

at least one m -bit register storing m bits of gradation data; and

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at least one digital/analog converter receiving said m bits of gradation data, having an output connected to sources of said n output transistors, and producing a voltage which is applied to the sources of said n output transistors in accordance with the m bits of stored gradation data, wherein the driving current for the one printing dot is controlled based on a combination of correction data and gradation data.

The references relied on by the examiner are:

Kapes, Jr. (Kapes)	4,074,320	Feb.
14, 1978		
Dahlquist et al. (Dahlquist)	5,062,002	Oct. 29,
1991		
Higuchi ¹	1-160659	June 23, 1989
(Published Japanese Kokai Patent Application)		

Claims 9 through 16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Dahlquist in view of Higuchi and Kapes.

Reference is made to the briefs (paper numbers 27 and 30) and the answer (paper number 28) for the respective positions of the appellants and the examiner.

OPINION

We have carefully considered the entire record before us, and we will reverse the obviousness rejection of claims 9 through 16.

¹ A copy of the translation of this reference is attached.

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According to the examiner (answer, page 4), "Dahlquist et al. clearly suggest m bit registers (latch 45a) which store m bit gradation data and have outputs which produce a voltage applied to a drain and source of a transistor, and a digital to analog converter (45)." The examiner acknowledges (answer, page 4) that Dahlquist lacks "n output transistors with outputs summed together at a summing node, n bit registers storing n bit correction data and having outputs connected to control ON or OFF states of the transistors, and a plurality of sets of n output transistors and a plurality of sets of n bit registers where the number of sets of n output transistors being the same as the number of sets of registers." For such missing teachings in Dahlquist, the examiner turns to Higuchi. Based upon the teachings of Dahlquist and Higuchi, the examiner concludes (answer, page 4) that "[i]t would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the Higuchi n output transistors and n bit registers with the Dahlquist et al. invention and further to provide LEDs in the Dahlquist et al. invention, particularly since it is known to drive different energy sources used for recording (i.e., LEDs and styli) by use of

identical control apparatus, as suggested by Kapes, Jr.
(column 3, lines 35-39)."

Dahlquist discloses control circuits 22-1 through 22-P for supplying print voltages to styli 23-1 through 23-P, respectively (Figure 2; column 6, lines 29 through 31). Each of the control circuits includes two MOS transistors 49a and 49b that are connected together in series as a voltage divider that applies voltage to the stylus connected thereto (Figure 4A; column 7, lines 52 through 61). The drain of transistor 49a is connected to D/A converter 45, and the source of this transistor is connected to the drain of transistor 49b. The source of transistor 49b is connected to a bias voltage V. A programmable one-shot multivibrator 46 is connected to the gate of transistor 49b, and to the gate of transistor 49a via level converter 48 (column 7, lines 61 through 64). When the one-shot multivibrator is triggered, the voltage supplied to transistor 49a is sufficient to allow it to conduct and to thereby cause the voltage on stylus 23-p to rise to approximately the level of the output voltage from D/A converter 45 (column 7, line 61 through column 8, line 1). During this time, transistor 49b is turned off "so as to

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function as a high impedance to limit current drawn through transistor 49a to a small value" (column 8, lines 1 through 3).

Higuchi discloses a LED drive circuit for an LED printer (Figure 1). Higuchi recognizes that in such printers non-uniform dots of light and dark are created because of the differences of the emitted light intensity from individual LEDs (translation, page 2). To solve this problem, Higuchi provides a plurality of correction MOSFETs 4-1 through 6-1 to supplement main MOSFET 3-1. Correction data signals determine which ones of the correction MOSFETS are turned on at the same time that the main MOSFET is turned on to form a compound current signal that is used to drive LED 8-1 (translation, page 5).

Appellants argue (brief, pages 6 and 7) that neither Dahlquist nor Higuchi teaches or would have suggested controlling the driving current for one printing dot based on a combination of correction data and gradation data, and that there is a lack of motivation to combine the teachings of the references. With respect to the portion of Kapes referenced by the examiner, appellants argue (brief, page 9) that "it

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simply has no bearing on the issue of whether the combination of Dahlquist and Higuchi is proper." Appellants also argue (brief, page 9) that "Kapes itself provides no teachings beyond that of Dahlquist and Higuchi given that it too is devoid of any disclosure or suggestion of controlling the driving current for a printing dot based upon a combination of correction data and gradation data as set forth in the claims." Thus, appellants conclude (brief, pages 9 and 10) that:

Each of Dahlquist, Higuchi, and Kapes operate in a manner fundamentally different than the claimed invention. What the Examiner has done is pluck individual circuit elements from Dahlquist and Higuchi and combine them to produce Appellants' invention using Appellants' own claims as a guide. This is clearly improper Because the necessary motivation is missing in this case, the Examiner is engaging in impermissible hindsight reconstruction.

We agree with appellants' arguments. Accordingly, the obviousness rejection of claims 9 through 16 is reversed.

DECISION

The decision of the examiner rejecting claims 9 through 16 under 35 U.S.C. § 103(a) is reversed.

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REVERSED

KENNETH W. HAIRSTON)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
ANITA PELLMAN GROSS)	APPEALS AND
Administrative Patent Judge)	INTERFERENCES
)	
)	
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HOWARD B. BLANKENSHIP)	
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KWH:hh

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