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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MARTIN J. EDWARDS, IAIN M. HUNTER,
NIGEL D. YOUNG, and MARK T. JOHNSON

Appeal 2008-0356
Application 10/151,050
Technology Center 2600

Decided: June 27, 2008

Before ANITA PELLMAN GROSS, JOHN A. JEFFERY, and KEVIN F. TURNER, *Administrative Patent Judges*.

JEFFERY, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134 from the Examiner's rejection of claims 1, 3, 4, 8, 10, 11, 15, and 16. We have jurisdiction under 35 U.S.C. § 6(b). We affirm-in-part.

STATEMENT OF THE CASE

Appellants invented a method and a display device having an array of processors associated with a pixel or pixels for driving the display. Each processor receives an input of compressed information containing display settings, interpolates individual pixel data based on the display settings of the processor and at least one neighboring processor, and generates a higher resolution image. Alternatively, the input contains a specification of at least one image or feature and data specifying the pixels required to display the object or feature. Each processor in this alternative determines individual pixel data by comparing pixel addresses of the image or feature with pixel addresses of the pixel(s) associated with the processor. These arrangements avoid the need to provide the display device with individual display settings for each pixel.[1] Claim 1 is illustrative:

1. A display device, comprising:

an array of pixels; and

an array of processing elements, each associated with a respective group of pixels;

wherein each processing element comprises:

an input for receiving input display data relating to a plurality of the pixels and comprising a display setting for the processing element;

a processor for processing received input display data to determine individual pixel data for each of the group of pixels associated with the processing element, said processor being adapted to process the received input display data by interpolating the individual pixel data for each pixel of the associated group of pixels from the display setting for the

[1] *See generally* Spec. 2:1 – 3:32, 5:20 – 7:30, and 13:30 – 15:20.

processing element and a display setting or settings from respectively one or a plurality of neighboring processing elements; and

a pixel driver for driving the associated pixel or each pixel of the associated group of pixels with that pixel's determined individual pixel data.

The Examiner relies on the following prior art references to show unpatentability:

Thompson	US 5,515,076	May 7, 1996
Lewis	US 5,963,210	Oct. 5, 1999
Blalock	US 6,441,829 B1	Aug. 27, 2002 (filed Nov. 18, 1999)

The Examiner's rejections are as follows;

1. Claims 1, 3, 4, 8, 10, and 11 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Thompson and Blalock.

2. Claims 15 and 16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Lewis and Blalock.

Rather than repeat the arguments of Appellants or the Examiner, we refer to the Briefs[2] and the Answer[3] for their respective details. In this decision, we have considered only those arguments actually made by Appellants. Arguments which Appellants could have made but did not make in the Briefs have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(vii).

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[2] We refer to the most recent Appeal Brief filed November 17, 2006, and the Reply Briefs filed November 27, 2006 and August 13, 2007 throughout this opinion.

[3] We refer to the most recent Examiner's Answer mailed June 11, 2007 throughout this opinion.

OPINION

The Rejection Based on Thompson and Blalock

Claims 1, 3, and 4

We first consider the Examiner's rejection of claims 1, 3, 4, 8, 10, and 11 under 35 U.S.C. §103(a) as unpatentable over Thompson and Blalock. Regarding independent claim 1, the Examiner's rejection essentially finds that the Figure 16 embodiment of Thompson discloses all the features recited in claim 1, except for each processing element having a pixel driver and a processor adapted to process the received input display data by interpolating individual pixel data for each pixel (Ans. 3-4). The Examiner cites to: (1) an alternative embodiment in Thompson to teach the missing interpolating feature of the processor and (2) Blalock to teach the missing pixel driver (Ans. 3-5). In view of the teachings in the alternative embodiment of Thompson, the Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the Figure 3 processing element of Thompson with at least one processing element in Figure 16 because the alternative embodiments are known equivalents and in order to smooth the image and increase apparent resolution (Ans. 4-5). Additionally, in view of Blalock's teachings, the Examiner concludes that it would have been obvious to one of ordinary skill to replace the projector of Thompson with the pixel driver of Blalock in order to increase the pixel density while saving power (Ans. 5).

Appellants argue neither reference discloses or teaches the feature of a "processor being adapted to process the received input display data by interpolating the individual pixel data for each pixel of the associated group of pixels from the display setting for the processing element and a display

setting or settings from respectively one or a plurality of neighboring processing elements" as recited in claim 1 (App. Br. 6-8; Reply Br. 3-4).

The issue before us is whether the combination of Thompson and Blalock discloses or teaches a processor adapted to process the received input display data by interpolating the individual pixel data for each pixel of the associated group of pixels from the display settings of the processing element and at least one neighboring processing element. For the following reasons, we find that the combination does not.

The display device in the Figure 16 embodiment of Thompson includes an array of the processing cells or elements 810, 820, and 830 (Thompson, col. 19, ll. 26-30). Each processing element communicates with its neighboring processing element during the fill operation to determine whether to modify or change the plane (Thompson, col. 20, l. 57 – col. 21, l. 16). Thompson, however, fails to discuss these processing elements having a processor that interpolates individual pixel data from the display settings of the processing element or its neighboring processing element.

The display device in the Figure 3 embodiment of Thompson includes a processor 154 that interpolates individual pixel data for a pixel of an associated group of pixels. The technique involves inputting one pixel of NTSC data and interpolating or computing fifteen (15) additional pixels using a nearest-neighbor algorithm. Additionally, the processor in Figure 3 is adapted to process the data by interpolating pixel data from some settings of the processing element (Thompson, col. 10, ll. 42-60). In the context of this embodiment, there is, however, no discussion of additionally interpolating the individual pixel data for each pixel from display settings of one or a plurality of *neighboring* processing elements. That is, Thompson

does not disclose or teach a processor adapted to process the received input display data by interpolating individual pixel data for each pixel by interpolating the individual pixel data from the display settings of the processing element *and* a display setting or settings from one or a plurality of processing elements as claimed.

Moreover, Blalock does not cure the deficiencies of Thompson. Blalock discloses the details of a pixel driver and fails to discuss any details regarding processing elements of a display device.

For the foregoing reasons, we will not sustain the Examiner's rejection of independent claim 1 or dependent claims 3 and 4.

Claims 8, 10, and 11

Independent claim 8 recites a method of driving a display device that has an array of pixels comprising the step of "the processing element processing the received input display data to determine individual pixel data for each pixel of the associated group of pixels by interpolating the individual pixel data for each pixel of the associated group of pixels from the display setting of the processing element" and at least one neighboring processing elements associated with a further group of pixels. For claim 8, the Examiner uses the same ground of rejection as claim 1 (Ans. 3-5) and that discussion is incorporated by reference. Appellants repeat the argument that neither Thompson nor Blalock teaches the step of a processing element processing input display data to determine individual pixel data for each pixel by interpolating the individual pixel data for each pixel from the display settings of the processing element associated with a group of pixels

and a neighboring processing element associated with a further group of pixels (App. Br. 9).

Our previous discussion pertaining to Thompson and Blalock applies equally here and we therefore incorporate that discussion by reference. As neither Thompson nor Blalock discloses a processor that interpolates individual pixel data from the display setting of the processing element and a display setting from at least one neighboring processing element, the prior art also does not disclose or teach the step of "the processing element processing the received input display data to determine individual pixel data for each pixel of the associated group of pixels by interpolating the individual pixel data for each pixel of the associated group of pixels from the display settings for the processing element" *and* "one or a plurality of neighboring processing elements" as recited in claim 8.

For the foregoing reasons, we will not sustain the Examiner's rejection of independent claim 8 or dependent claims 10 and 11.

The Rejection Based on Lewis and Blalock

Claim 15

We next consider the Examiner's rejection of claims 15 and 16 under 35 U.S.C. § 103(a) as unpatentable over Lewis and Blalock. Independent claim 15 recites, in pertinent part, a display device having an array of processing elements associated with a pixel or group of pixels and each processing element having: (1) an input for receiving input display data related to a plurality of the pixels; (2) a memory for storing pixel addresses of a pixel or group of pixels; (3) a processor for processing the received

input display data; and (4) a pixel driver for driving the associated pixel with the pixel's determined individual pixel data.

The Examiner's rejection essentially finds that Lewis discloses all the features recited in claim 15, except for the pixel driver (Ans. 7-8). The Examiner cites Blalock to teach the missing limitation (Ans. 9). In view of the Blalock teaching, the Examiner concludes that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the rasterizer of Lewis to include a pixel driver in order to increase the pixel density while saving power (Ans. 9). Appellants argue that Lewis fails to disclose each processing element has a pixel driver as claimed. Additionally, Appellants contend Lewis cannot be modified as suggested because the outputs of all processors in the processing array are combined before producing the image (App. Br. 11).

The issue before us, then, is whether the combination of Lewis and Blalock teaches each processing element in the array of processing elements includes a pixel driver for driving the associated pixel or each pixel of the associated group of pixels with that pixel's determined individual pixel data. For the following reasons, we find that the combination does not.

Lewis discloses an array of processing elements 505, each receiving a graphic primitive or triangle and determining whether the triangle intersects with the current pixel being evaluated (Lewis, col. 5, l. 64 – col. 6, l. 12 and col. 9, ll. 53-58). As Figures 4 and 5 show, the individual pixel values are calculated at the interpolator 407 and then projected on the display at 109. The pixels are thus driven by a pixel driver once the interpolation step is completed (Lewis, col. 6, ll. 35-37 and 47-50; Figs. 4-5), and each processor in the array does not, therefore, include a pixel driver. Moreover, while it is

possible for each processing element in Lewis to have a pixel driver, Lewis fails to discuss, teach, or suggest a rationale for modifying the processing array 505 such that each processing element contains a pixel driver.

Blalock does not cure the deficiencies of Lewis. Blalock teaches using a pixel driver to increase the density of the pixels while saving on power (Blalock, col. 4, ll. 35-36 and 50-57). However, Blalock does not discuss an array of processing elements or including a pixel driver for each processing element of a processor array. Blalock, therefore, provides no teaching to modify the display device of Lewis so that each processing element in array 505 includes a pixel driver. Even if Blalock did teach such an arrangement, the modification of Lewis to place multiple pixel drivers within the processor array 505 would not be practical since the data would still need to proceed to the interpolator 407 before being sent at 44 to the display 109.

We, therefore, find that the combination of Lewis and Blalock fails to disclose, teach, or suggest the limitation of each processing element comprising "a pixel driver for driving the associated pixel or each pixel of the associated group of pixels with the pixel's determined individual pixel data" as recited in claim 15.

For the foregoing reasons, we will not sustain the Examiner's rejection of independent claim 15.

Claim 16

Independent claim 16 recites a method of driving a display device comprising the steps of receiving input display data relating to a plurality of pixels at a processing element associated with one or a group of pixels, the

processing element processing the received input display data and driving the associated pixel or each pixel of the associated group at the specified display setting, and the processing element further driving the associated pixel or each pixel of the associated group of pixels.

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 (Fed. Cir. 1988). In so doing, the Examiner must make the factual determinations set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966).

Discussing the question of obviousness of a patent that claims a combination of known elements, the U.S. Supreme Court explains:

> When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill. *Sakraida* [*v. AG Pro, Inc.,* 425 U.S. 273 (1976)] and *Anderson's-Black Rock*[*, Inc. v. Pavement Salvage Co.*, 396 U.S. 57 (1969)] are illustrative—a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions.

KSR Int'l v. Teleflex, Inc., 127 S. Ct. 1727, 1740 (2007). If the claimed subject matter cannot be fairly characterized as involving the simple substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for the improvement, a holding

of obviousness can be based on a showing that "there was an apparent reason to combine the known elements in the fashion claimed." *Id.* at 1740-41. Such a showing requires,

> 'some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness' . . . . [H]owever, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ. *Id.* at 1741 (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

If the Examiner's burden is met, the burden then shifts to the Appellant to overcome the prima facie case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. *See In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992).

For claim 16, the Examiner uses the same ground of rejection as claim 15 (Ans. 7-9) and that discussion is incorporated by reference. Appellants argue that the prior art does not disclose or teach the steps of: (1) receiving input display data relating to a plurality of the pixels at the processing element associated with one or a group of pixels; (2) processing the received input display data to determine the individual pixel data for the associated pixel or for each pixel of the associated group of pixels; and (3) each processing element driving the associated pixel or each pixel of the associated group of pixels at a specified display setting if the respective pixel lies within a specific shape at a specified position in the pixel array (App. Br. 12). Specifically with regards to purported missing elements (1) and (2), Appellants argue that Lewis and Blalock do not disclose or teach the feature of the processing element being associated with a group of pixels. In

Appellants' view, Lewis only discloses that the processing element is associated with a triangle and not with pixels (App. Br. 10, 12).

During examination of a patent application, a claim is given its broadest reasonable construction "in light of the specification as it would be interpreted by one of ordinary skill in the art." *In re Am. Acad. Of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004). As the Specification has not provided a special definition of the term, "associated," and Appellants have not provided any evidence that the term has a particular meaning to those skilled in the art, the term will be given its ordinary and customary meaning. *Phillips v. AWH Corp.,* 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc). The Merriam-Webster's Online Dictionary[4] defines "associate" as "to bring together or into relationship in any of various intangible ways (as in memory or imagination)." We, therefore, find the phrase "a processing element associated with one or a group of the pixels" in claim 16 to mean a processing element related to one or a group of pixels in any of various ways.

Lewis discloses a processing element or rasterizer 403 that includes an array of processors, each processor receiving input display data or a triangle (Lewis, col. 5, ll. 45-67). Each of these triangles represents the surface of an object and includes an x and y position of a point in screen space (Lewis, col. 4, l. 46 – col. 5, l. 19 and col. 7, l. 58 – col. 8, l. 18). Additionally, each triangle is analyzed to determine whether it intersects with the current pixel being processed (Lewis, col. 6, ll. 1-3 and 9-34 and col. 8, ll. 34-58). Thus,

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[4] The Merriam-Webster's Online Dictionary, 10th ed., *available at* http://www.merriam-webster.com/cgi-bin/dictionary?book=Dictionary&va=associate (last visited June 10, 2008).

each processor in Lewis receives data related or associated with one or a group of pixels as claimed.

Moreover, Lewis discloses a processing element 403 consisting of the array of processors 505 (Lewis, col. 7, ll. 6-7; Fig. 5). This array contains pixel information for all of the pixels in the display device (Lewis, col. 6, ll. 25-52 and col. 8, ll. 41-58). Otherwise, the image shown in the display 109 would be incomplete. *See* Lewis, col. 6, ll. 46-50. Because the processing element 403 receives input display data related to or associated with a group of pixels, Lewis discloses the step of "receiving, at a processing element associated with one or a group of the pixels, input display data relating to a plurality of the pixels" and "processing the received input display data to determine individual pixel data for the associated pixel or for each pixel of the associated group of pixels" as recited in claim 16.

Appellants also challenge that Lewis and Blalock do not disclose *each* processing element driving the associated pixel or each pixel of the associated group of pixels at the specified display setting (App. Br. 12). We are unpersuaded by this argument. First, claim 16 only recites a single processing element. Thus, any discussion regarding the prior art failing to teach *each* or multiple processing elements driving associated pixels is not commensurate with the scope of claim 16. Second, Lewis discloses a display device with a "processing element" (i.e., rasterizer 403) that generates the pixel data at a specified display setting if a respective pixel lies within the specified shape at the specified position in the pixel array (Lewis, col. 4, ll. 62-65; col. 6, ll. 25-38 and col. 7, l. 58 – col. 8, l. 40). Furthermore, once the data has been generated and interpolation has been completed, the processing element 403 sends and drives the pixel data to the

display (Lewis, col. 6, ll. 35-37 and 46-50 and col. 9, ll. 43-50). We, therefore, find that Lewis discloses the step of "the processing element driving the associated pixel or each pixel of the associated group of pixels at the specified display setting if the respective pixel lies within the specified shape at the specified position in the pixel array" as recited in claim 16.

Lastly, Blalock provides a reasonable rationale for including a pixel driver in the processing element of Lewis so that the outputted data contains information that increases pixel density with less power consumption (Blalock, col. 4, ll. 35-36 and 50-57; Ans. 9). Additionally, given that claim 16 only recites a single processing element driving the associated pixel or each pixel of the associated group of pixels, Appellants' argument that Lewis cannot be modified as suggested without destroying the operation of the rasterizer 403 does not hold. That is, we find nothing on this record that would preclude ordinarily skilled artisans from including a single pixel driver in the Lewis rasterizer or processing element after the interpolator 407. Such a modification, in our view, would hardly destroy the operation of the rasterizer.

For the foregoing reasons, we find no error in the Examiner's obviousness rejection of independent claim 16.

DECISION

In summary, we have sustained the Examiner's obviousness rejection of claim 16, and we have reversed the Examiner's rejections with respect to claims 1, 3, 4, 8, 10, 11, and 15 on appeal.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a)(1)(iv).

AFFIRMED-IN-PART

tdl/gw

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