

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 17

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ROBERT C. BAKER,
WILLIAM J. DONOGHUE,
STEPHEN H. KELLEY
and CLAUDE HILBERT

Appeal No. 1998-0750
Application 08/292,135¹

ON BRIEF

Before URYNOWICZ, JERRY SMITH and FRAHM, Administrative Patent Judges.

URYNOWICZ, Administrative Patent Judge.

Decision on Appeal

This appeal is from the final rejection of claims 1-7, 9-13, 15-22, 24, 25, 27-30, 32-35, 38-42, 45-51 and 53-63. Claims 8, 14, 23, 26, 31, 36, 37, 43, 44 and 52 are objected to as being dependent upon a rejected claim, and would be allowable if

¹ Application for patent filed August 17, 1994.

rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The invention pertains to a method and apparatus for equalizing variations in the light output of pixels. Claims 1, 4 and 7 are illustrative and read as follows:

1. A method for increasing uniformity in screen brightness within a field emission matrix addressable display panel, said method comprising the step of:

measuring energy dissipation in a first pixel within said display panel; and

compensating energy dissipation in a second pixel within said display panel as a function of said measured energy dissipation in said first pixel.

4. A system for displaying images on a matrix addressable display panel, said system comprising:

a plurality of pixels arranged within said display panel; and driver means for selectively illuminating said pixels, wherein said driver means further comprises:

means for measuring current dissipation in a first pixel within said display panel; and

means for compensating current dissipation in a second pixel within said display panel as a function of said measured current dissipation in said first pixel.

7. A circuit adaptable for regulating energy supplied to a pixel within a matrix addressable display panel, said circuit comprising:

means for comparing a first voltage signal, which is proportional to a second voltage signal supplied to said pixel, to a reference voltage signal; and

means for removing said second voltage signal from said pixel in response to a comparison of said first and reference voltage signals, wherein said removing means turns off said pixel.

Appeal No. 1998-0750
Application 08/232,135

The references relied upon by the examiner as evidence of obviousness are:

Kanayama	4,897,639	Jan. 30, 1990
Fukuoka et al. (Fukuoka)	5,111,195	May 05, 1992
Kumar et al. (Kumar)	5,449,970	Sep. 12, 1995

Claims 4 and 61-63 stand rejected under 35 U.S.C. § 103 as being unpatentable over Kanayama.

Claims 1 and 6 stand rejected under 35 U.S.C. § 103 as being unpatentable over Kanayama and Kumar.

Claims 7, 11-13, 17, 18, 24, 25, 28, 29, 32-35, 47, 48, 50 and 53-60 stand rejected under 35 U.S.C. § 103 as being unpatentable over Fukuoka.

Claims 9, 10, 16, 19, 20, 27 and 49 stand rejected under 35 U.S.C. § 103 as being unpatentable over Fukuoka and Kumar.

Claims 15, 21, 22, 30, 38-42, 45, 46 and 51 stand rejected under 35 U.S.C. § 103 as being unpatentable over Fukuoka and Kanayama.

Claim 5 stands rejected under 35 U.S.C. § 103 as being unpatentable over Kanayama and Fukuoka.

Claims 2 and 3 stand rejected under 35 U.S.C. § 103 as being unpatentable over Kanayama, Kumar and Fukuoka.

Appeal No. 1998-0750
Application 08/232,135

The respective positions of the examiner and the appellants with regard to the propriety of these rejections are set forth in the final rejection (Paper No. 11) and the examiner's answer (Paper No. 16) and the appellants' brief (Paper No. 13).

Appellants' Invention

An adequate description of the invention is set forth at pages 2 and 3 of the brief.

The Prior Art

In Figures 1 and 2, Kanayama discloses a system for producing uniformity of screen brightness in a matrix display panel having a diode structure 3-5. Light intensity of a first pixel within the display panel is measured and the intensity of a second pixel within the display panel is compensated as a function of the measured light intensity of the first pixel.

In Figure 1, Fukuoka discloses a circuit for regulating voltage applied to a pixel at electrode 102. A differential amplifier 1 compares a first voltage fed back to the negative terminal of element 1 to a video signal input at 6. When the voltage V_G appearing at the output terminal 13 of the differential

amplifier 1 is higher than the voltage V_{OUT} on the output line 9, the first output transistor 2 is turned on so that a charge current flows from first output transistor 2 to the output line 9. As a result, the voltage V_{OUT} is raised till it equals a voltage V_{IN} input to the non-inverted terminal of the differential amplifier 1. In this period, the transistors 10, 11 and 12 remain off.

When the voltage V_G is lower than the voltage V_{OUT} , a drain current flows from the transistor 10 so that the drain voltage of the transistor 10 controls the gate of the output control transistor 11. This causes a drain current to flow from the output control transistor 11, thereby the second output transistor 12 is turned on to flow a discharge current. As a result, the voltage V_{OUT} is reduced till it equals the voltage V_{IN} .

Kumar discloses a matrix-addressed diode flat panel display of the field emission type. In Figure 1, Kumar discloses apparatus for addressing the panel display.

Opinion

We will sustain the rejection of independent claim 4, and claims 61-63 which depend therefrom, as obvious over Kanayama.

Appellants argue that the claim 4 requirements that

current dissipation in a first pixel is measured and then that current dissipation in a second pixel is compensated for as a function of the measured current dissipation are not met by the reference. It is urged that, in contrast, Kanayama teaches that light emitted from a second pixel is compensated for as a result of a disparity in illumination between first and second pixels. The examiner states to the effect that Kanayama teaches measuring the amount of light emitted by first and second pixels and controlling the intensity of light emitted from a weak pixel (i.e., the second pixel) by controlling the length of time that current is applied to the second pixel until the intensity of light from the second pixel equals the intensity of light from the first pixel. The examiner's position is to the effect that it would have been obvious to measure the intensity of emitted light in the first and second pixels of Kanayama by measuring energy or current dissipation in the pixels, rather than measure the intensity of emitted light directly.

We find appellants' argument unpersuasive. As for diodes that produce weak light, Kanayama compensates current dissipation in the diodes by increasing the length of time that current is applied to the diodes so that the pixels of a display panel formed

Appeal No. 1998-0750
Application 08/232,135

by the diodes will have uniform brightness (Kanayama column 6, lines 44-58). This is compensating current dissipation. Whereas the brightness of a pixel is clearly a function of the current dissipation therein, as taught by Kanayama and indicated above, we agree with the examiner that it would have been obvious to one of ordinary skill in the art at the time the invention was made to measure current dissipation in pixels of Kanayama as opposed to the intensity of their emitted light so as to produce uniform brightness in pixels in a display panel. A conclusion of obviousness may be made from common knowledge and common sense of the person of ordinary skill in the art without any specific hint or suggestion in a particular reference. In re Bozek, 416 F.2d 1385, 1390, 163 USPQ 545, 549 (CCPA 1969).

Dependent claim 61 is not argued by appellants and we will sustain its rejection for the reason given by the examiner. As to dependent claim 62, Kanayama teaches compensating current dissipation in a plurality of pixels. At column 6, lines 49-52, the reference discloses that for diodes of a display panel that produce weak light, the value of compensation data is decreased so as to increase the length of time of light emission. With respect to dependent claim 63, the measuring of current dissipation in a

Appeal No. 1998-0750
Application 08/232,135

first pixel and compensating of current dissipation in a second pixel in Kanayama as modified by the examiner would have been performed in a dynamic manner because the modified Kanayama would have operated in essentially the same way as appellants' apparatus.

We are not persuaded by appellants' argument with respect to independent claim 1, or claim 6, which depends from claim 4. Accordingly, we will sustain their rejection as obvious over Kanayama and Kumar. The position that Kanayama is not prior art to the present invention because Kanayama pertains only to displays using LEDs and the driver circuitry used for driving LEDs is different than that used for driving field emission devices is not convincing. The apparatus of Kanayama, like that of appellants, relates to light-emitting display panels which utilize diodes as light sources. Thus, although Kanayama does not disclose a diode cold cathode display, it is analogous art. Section 103 requires us to presume that the artisan has full knowledge of the prior art in his field of endeavor and the ability to select and utilize knowledge from analogous arts. In re Deminski, 796 F.2d 436, 442, 230 USPQ 313, 315 (Fed. Cir. 1986). The suggestion to combine the prior art need not be

explicit. In re Bozek, supra. The motivation to combine the prior art would have been to provide uniform brightness in the diode cold cathode display panel of Kumar.

We will sustain the rejection of independent claims 7 and 47, and claims 11, 13, and 17 which depend from claim 7, as obvious over Fukuoka. We will also sustain the rejection of independent claim 28, and claims 29 and 32 which depend therefrom, as obvious over this reference. With respect to claim 7, appellants state that the limitation "removing said second voltage signal from said pixel in response to a comparison of said first and reference voltage signals, wherein said removing means turns off said pixel," is not met by Fukuoka. It is noted that the examiner acknowledges that Fukuoka does not explicitly disclose removing means turning off the pixel and that the examiner takes the position that it was well-known in the art that when no voltage is applied to an electrode or pixel, the pixel will be turned off, and that when the voltage V_{IN} is 0, the voltage V_{OUT} is reduced to an equal 0. Appellants assault this position, asserting that a 0 level voltage is still a voltage and is not the same as removing a voltage from the pixel.

Appeal No. 1998-0750
Application 08/232,135

We agree with the examiner. Under the example espoused by the examiner, when a 0 voltage is applied as a second voltage signal in response to a comparison in differential amplifier 1, the preceding second voltage is removed and the pixel will turn off in accordance with the claim. The pixel cannot remain on with 0 voltage applied across it. Furthermore, the examiner's statement to the effect that a 0 level voltage is applied to a pixel is just another way of saying that no voltage is applied to the element.

Whereas appellants have not specifically argued dependent claims 11 and 13, or independent claim 28 and claim 29 which depends therefrom, we will sustain the rejection of these claims as obvious over Fukuoka. Because appellants argue that claims 17 and 32 are allowable for the same reason as claim 7, and we will sustain the rejection of claim 7 as indicated above, we will sustain the rejection of claims 17 and 32 as obvious over Fukuoka.

As to independent claim 47, it is argued that Fukuoka does not teach or suggest providing the sampled current to an external circuit. We disagree. The sampled current in the reference is carried over a feedback line to an input of differential amplifier 1. The terminology "external circuit" is broad and differential

Appeal No. 1998-0750
Application 08/232,135

amplifier 1 is an external circuit in that it is not part of the display panel itself.

We will sustain the rejection of dependent claims 9, 10, 16 and 49 as obvious over Fukuoka and Kumar. Appellants argue that the references do not teach means for removing the voltage signal from the pixel in response to a comparison. This is essentially the same argument made with respect to the rejection of claim 7, which argument we found unpersuasive. Otherwise, appellants' observations that Fukuoka does not teach that a pixel is of a diode configuration having an anode and a cathode and that Kumar does not teach any type of compensation of energy or current signal supplied to an electrode of a pixel do not overcome the rejection. Nonobviousness cannot be established by attacking references individually. The prior art must be evaluated as a whole. In re Evanega, 829 F.2d 1110, 1112, 4 USPQ2d 1249, 1251 (Fed. Cir. 1987).

Claims 15, 30, 38 and 45 are not separately argued by appellants and we will sustain the rejection of these claims as obvious over Fukuoka and Kanayama for the reasons given by the examiner.

Claim 46 depends from claim 38. At page 13 of the answer, the examiner reasoned that "since Fukuoka's driving circuit consumes less power (col. 3, lines 46-48), therefore, Fukuoka's first to fourth circuitry are implemented on a low-voltage chip." Whereas this position is on its face reasonable and appellants have not responded thereto, we will sustain the rejection of claim 46 as obvious over Fukuoka and Kanayama.

We will not sustain the rejection of independent claim 18, and claims 24 and 25 which depend therefrom, as obvious over Fukuoka. Claim 18 recites "means for integrating said second current" and "means for comparing said integrated second current to an integrated reference current". With reference to Fukuoka's Figure 1, the feedback line of the circuit between output line 9 and differential amplifier (comparator) 1 has no integrator. The examiner observes that the reference provides an integrator capacitor CH to provide an integrated reference current and takes the position that it would have been obvious to modify the circuit of Fukuoka to have an integrator capacitor for integrating the second current on the feedback line because the mere duplication of parts in a device involves only routine skill in the art. This position is unpersuasive. Even though the modification merely

Appeal No. 1998-0750
Application 08/232,135

involves adding another capacitor to the circuit of Fukuoka, the examiner has set forth no motivation for the modification suggested. The mere fact that the prior art may be modified in the manner suggested by the examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. In re Fritch, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1783-84 (Fed. Cir. 1992).

Independent method claim 33 recites the steps of integrating a first current signal, integrating a second current signal, and comparing the integrated first and second signals. Independent apparatus claim 50 recites first means for integrating a first energy signal, second means for integrating a second energy signal, and means for comparing the first and second integrated energy signals. In view of the above limitations, the rejection of claims 33 and 50 as obvious over Fukuoka will not be sustained for the same reason that the rejection of independent claim 18 will not be sustained.

Whereas claims 34, 35, 55, 56 and 57 depend directly or indirectly on claim 33 and claims 53 and 54 depend directly on claim 50, we will not sustain the rejection of these claims as obvious over Fukuoka. Whereas claim 51 depends directly on claim

Appeal No. 1998-0750
Application 08/232,135

50, we will not sustain the rejection of claim 51 as obvious over Fukuoka and Kanayama.

In that claims 19-22 and 27 depend directly or indirectly from independent claim 18, we will not sustain the rejection of claims 21 and 22 as obvious over Fukuoka and Kanayama, or of claims 19, 20 and 27 as obvious over Fukuoka and Kumar. Claims 2 and 3, which depend from claim 1, are drawn to steps of integrating first and second current signals, and claim 5, which depends from claim 4, requires means for comparing integrated sensed current to a reference integrated current. As such, we will not sustain the rejection of claim 5 as obvious over Fukuoka and Kanayama or the rejection of claims 2 and 3 as obvious over Fukuoka, Kanayama and Kumar for the same reason we will not sustain the rejection of independent claim 18. Neither Kanayama nor Kumar have been shown to relate to a plurality of integrated currents.

We will not sustain the rejection of independent claim 58 and dependent claims 59 and 60 as obvious over Fukuoka. Claim 58 recites means for modifying an energy signal applied to a pixel in response to detection of a noise-related signal in said energy signal by monitoring means. Fukuoka is silent regarding detection

of a noise-related signal in an energy signal. Nevertheless, the examiner's position at page 12 of the answer is that,

Fukuoka uses a comparator to get an V_{out} which is equal to V_{in} , if a different voltage is produced (noise-related signal is detected), the V_g is inputted to the comparator until the V_{out} is equal to the V_{in} (col. 5, lines 20-40), so, the unwanted different voltages (noise-related signal or crosstalk) is not produced in the display panel.

We are not persuaded by the examiner's position. With respect to Figure 1 of Fukuoka, V_{OUT} would be the energy signal applied to a pixel of claim 58. However, Fukuoka does not detect a noise-related signal in the energy signal and, accordingly, discloses no means for modifying the energy signal in response to detection of a noise-related signal. Although Fukuoka modifies V_{OUT} , it is in response to V_g , which is neither a noise-related signal nor in the energy signal.

We will not sustain the rejection of dependent claims 12 and 48 as obvious over Fukuoka or of dependent claims 39-42 as obvious over Fukuoka and Kanayama. We do not agree with the examiner that the feedback line of Fukuoka is a current mirror circuit. A current mirror circuit includes at least two outputs providing output currents. Fukuoka's feedback line has but one circuit line which could be considered as providing a current output.

Furthermore, appellants disclose at page 16, lines 23 and 24, of

Appeal No. 1998-0750
Application 08/232,135

their specification that the essential function of a current mirror is to provide identical currents at its outputs. Accordingly, even if Fukuoka's feedback line and the output line 9 were to be considered, the lines could not constitute a current mirror because there is no teaching that the currents on the two lines are the same. Although the two lines share a common voltage, their impedances are different and the resulting currents would also be different. Fukuoka's feedback line exhibits the impedance of the differential amplifier 1 and the line 9 exhibits the impedance of a signal electrode of the display device.

Summary

The rejection of claims 4 and 61-63 under 35 U.S.C. § 103 as being unpatentable over Kanayama is sustained.

The rejection of claims 1 and 6 under 35 U.S.C § 103 as being unpatentable over Kanayama and Kumar is sustained.

The rejection of claims 7, 11-13, 17, 18, 24, 25, 28, 29, 32-35, 47, 48, 50 and 53-60 under 35 U.S.C. § 103 as being unpatentable over Fukuoka is sustained as to claims 7, 11, 13, 17, 28, 29, 32 and 47 but reversed as to claims 12, 18, 24, 25, 33-35, 48, 50 and 53-60.

The rejection of claims 9, 10, 16, 19, 20, 27 and 49 under

Appeal No. 1998-0750
Application 08/232,135

35 U.S.C. § 103 as being unpatentable over Fukuoka and Kumar is sustained as to claims 9, 10, 16 and 49 but is reversed as to claims 19, 20 and 27.

The rejection of claims 15, 21, 22, 30, 38-42, 45, 46 and 51 under 35 U.S.C. § 103 as being unpatentable over Fukuoka and Kanayama is sustained as to claims 15, 30, 38, 45 and 46 but is reversed as to claims 21, 22, 39-42 and 51.

The rejection of claim 5 under 35 U.S.C. § 103 as being unpatentable over Kanayama and Fukuoka is reversed.

The rejection of claims 2 and 3 under 35 U.S.C. § 103 as being unpatentable over Kanayama, Kumar and Fukuoka is reversed.

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

AFFIRMED-IN-PART

Appeal No. 1998-0750
Application 08/232,135

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Appeal No. 1998-0750
Application 08/232,135