Paper No. 19

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KENICHI WADA, ITARU SAITO,
and TSUKASA YAGI

Appeal No. 2001-1420
Application No. 08/988,453

ON BRIEF

Before BARRETT, RUGGIERO, and BLANKENSHIP, Administrative Patent Judges.

BLANKENSHIP, 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 1-15, which are all the claims in the application.

We reverse.

BACKGROUND

The invention is directed to method and apparatus that enables an optical write device to write multi-tone images on a photosensitive member, such as photographic paper. According to appellants, the relatively low-bit (e.g., six-bit) driver ICs, which set the tone level of each pixel, that are used in the pertinent art cannot normally reproduce high quality multi-tone images which require a larger number of bits for encoding tone level. Appellants' invention includes providing additional levels of tone level control by modulating the pulse width or the pulse intensity of the signal produced by the driver IC. Nine-bit data for the tone level of a particular pixel may be converted into three sets of six-bit data, allowing six-bit driver ICs to be used. Representative claims 1 and 12 are reproduced below.

> 1. A method for driving an [sic] write device which writes an image based on image data, the method comprising the step of:
>
> dividing a time for formation of a pixel into a plurality of periods and performing multi-tone level control based on the image data in each of the periods, said multi-tone level including at least three levels.
>
> 12. The method for driving an [sic] write device, the method comprising the steps of:
>
> a first step of converting an n-bit image data for one pixel into a plurality of sets of m-bit data, wherein m is larger than 1 but smaller than n;
>
> a second step of modulating a write element based on a first set of data of the plurality of sets; and
>
> a third step of modulating the write element based on a second set of data of the plurality of sets.

The examiner relies on the following references:

Dir et al. (Dir)	5,193,011	Mar. 9, 1993
Takahashi	5,614,936	Mar. 25, 1997 (filed Oct. 12, 1994)

Claims 1-15 stand rejected under 35 U.S.C. § 103 as being unpatentable over Takahashi and Dir.

We refer to the Final Rejection (Paper No. 8) and the Examiner's Answer (Paper No. 16) for a statement of the examiner's position and to the Brief (Paper No. 15) and the Reply Brief (Paper No. 17) for appellants' position with respect to the claims which stand rejected.

OPINION

The rejection (Answer at 3) contends that Takahashi teaches dividing a time for formation of a pixel into a plurality of periods and performing tone level control based on the image data in each of the periods, referring to material at columns 3 and 4 of the reference. Takahashi is deemed, however, to lack a teaching of "multi-tone level including at least three levels." (Id. at 4.) The rejection relies on Dir as teaching multi-tone level including at least three levels, referring to Figure 1 and Figure 4(c) of Dir. (Id.)

Appellants argue (Brief at 4-5) that each "sub-pixel" in Takahashi is either exposed to be black or is unexposed, not a multi-tone level including at least three levels as required by claims 1 and 13. Further, appellants argue that the "halftone cells"

shown in Figure 1 of Dir are composed of a number of pixels. Even if each "halftone cell" were considered to be "one pixel," the elements making up the "pixel" are merely black or white, as opposed to the claimed "at least three levels."

We find no response from the examiner in the Answer with respect to appellants' argument regarding Takahashi. However, the examiner states in the Final Rejection (at 4) that "Takahashi teaches pixels having subpixels in the sub-scanning direction which are to be colored to obtain **different densities** of the pixel." Further, the examiner responds (Answer at 5-7) that each half-tone cell as disclosed by Dir is considered to be a single pixel with 16 sub-cells considered to be 16 sub-pixels, with each sub-pixel being "subjected to multi-tone levels, sixteen levels to be exact." (Id. at 7.)

The terms used in the claims bear a "heavy presumption" that they mean what they say and have the ordinary meaning that would be attributed to those words by persons skilled in the relevant art. Texas Digital Sys., Inc. v. Telegenix, Inc., 308 F.3d 1193, 1202, 64 USPQ2d 1812, 1817 (Fed. Cir. 2002). Dictionaries, encyclopedias, and treatises are particularly useful resources in determining the ordinary and customary meanings of claim terms. Id. at 1202, 64 USPQ2d at 1818. Indeed, these materials may be the most meaningful sources of information in better understanding both the technology and the terminology used by those skilled in the art to describe the technology. Id. at 1203, 64 USPQ2d at 1818.

"Pixel" is defined as "the smallest element of an image that can be individually displayed." Webster's Encyclopedic Unabridged Dictionary of the English Language at

1099 (1989 ed.). A technical dictionary defines "pixel" as the "smallest part of an electronically coded picture image" or the "smallest addressable element in an electronic display." McGraw-Hill Dictionary of Scientific and Technical Terms, Fifth Ed. at 1516 (1994).

We interpret "pixel" as used in appellants' claims, consistent with appellants' disclosure and with the ordinary meaning of the term, as referring to the smallest part (i.e., the basic unit) of an electronically coded picture image. Claims 1 and 13 thus require that the smallest part of the electronically coded image be based on a multi-tone level control of at least three levels, and thus distinguish over generation of simple on and off, or black and white, pixels.

Takahashi reflects an uncommon meaning for the term "pixel." Takahashi contends that a pixel may be divided into four or more elemental sections called "sub-pixels." Col. 1, l. 60 - col. 2, l. 30; Fig. 2. Perhaps the term "pixel" as used in Takahashi refers to the smallest unit that may be resolved by the human eye. In any event, the so-called sub-pixels referenced by Takahashi are more properly known as pixels, which may be combined to form units (halftone cells) of different gray scale levels (e.g., col. 2, ll. 51-57).

The Dir reference, on the other hand, uses the terms "pixels" and "halftone cells" consistent with their ordinary meanings. See col. 1, ll. 1-68. As shown in Figure 1, a halftone cell may be made up of 16 pixels, each of which may be black or white, yielding 17 different gray levels.

Even if Figure 1 of Dir might be considered as showing a multi-tone level including at least three levels (i.e., at least three gray levels), as attributed by the rejection, we do not find the teaching relevant to multi-tone level control with respect to formation of a pixel, as recited in instant claims 1 and 13. Moreover, in our opinion, proper interpretation of the term "pixel" as used in the claims also serves to distinguish over the method and apparatus described by Takahashi.

While most of the examiner's discussion centers on Figure 1 of Dir, as we have previously noted the statement of the rejection (Answer at 4) refers to Figures 1 and 4(c) for the teaching of "multi-tone level including at least three levels." The "Response to Argument" section of the Answer adds reference to Dir's Figure 7.

Figure 1 of Dir shows a related art method of presenting gray levels in a "typical" reproduction section using halftone cells. Col. 1, ll. 29-43. Figure 4(c) is essentially unrelated to the prior system of Figure 1. Figure 4(c) shows a measured gray level as a function of time as toner is propelled through a shutter (Figs. 3(a) and 3(b)) in a direct electrostatic printing (DEP) element. Col. 4, ll. 3-19. Dir's invention is deemed an improvement over use of halftone cells, utilizing pulse-width-modulated signals that control gray levels of individual pixels. Col. 3, ll. 17-51 and Fig. 2. Further details of the embodiment are set out in columns 4 and 5 of the reference.

While the embodiment of Dir's invention may be considered as showing a multi-tone level including at least three levels, the teaching is no closer to the instant claimed subject matter than the prior art driver ICs described on pages 2 and 3 of the instant

specification. We find no convincing rationale as to how Dir's teaching may be properly combined with Takahashi's description of driving an optical printhead -- i.e., with pixels having only two states -- so as to arrive at the subject matter of claim 1 or claim 13.

With regard to instant claim 12, appellants point out (Brief at 6) that the rejection fails to make the requisite factual findings as to how the prior art is to be applied. The examiner responds (Answer at 8) that the artisan would recognize that Dir's "teaching of dividing half-tone cells 105 into sixteen sub-cells suggests that the data representing half-tone cells 105 are broken down into smaller data bits and of course, an image is then printed based on the broken-down image data, as taught by Dir et al. in figures 1 and 7." Appellants respond in turn (Reply Brief at 1-2) that the examiner's assertions do not speak to the specific requirements of claim 12.

Claim 12 requires, as a first step, converting an n-bit image data for one pixel into a plurality of sets of m-bit data, wherein m is larger than 1 but smaller than n. For at least the reason that Dir does not disclose or suggest converting image data for one pixel into a plurality of sets of data, we agree with appellants that the specific requirements of the claim have not been shown as obvious in view of the prior art applied.

Since the prior art relied upon does not establish prima facie obviousness of the subject matter of any of the independent claims (1, 12, and 13), we do not sustain the section 103 rejection of claims 1-15.

CONCLUSION

The rejection of claims 1-15 under 35 U.S.C. § 103 is reversed.

REVERSED

LEE E. BARRETT Administrative Patent Judge	)
JOSEPH F. RUGGIERO Administrative Patent Judge	) BOARD OF PATENT) APPEALS) AND) INTERFERENCES
HOWARD B. BLANKENSHIP Administrative Patent Judge	)

MCDERMOTT WILL & EMERY
600 13TH STREET, N.W.
WASHINGTON , DC 20005-3096