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opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.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. 26

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte LAWRENCE A. RAY

Appeal No. 96-0113
Application 07/848,779[1]

HEARD: July 14, 1997

Before JERRY SMITH, LEE and CARMICHAEL, Administrative Patent Judges.

LEE, 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 1-7 and 11-18. Claims 8-10 were objected to as being dependent on an unallowable claim.

[1] Application filed March 10, 1992.

References Relied on by the Examiner

Daly et al. (Daly)	4,780,761	Oct. 25, 1988
Sullivan et al. (Sullivan '501)	4,920,501	Apr. 24, 1990
Parker et al. (Parker)	5,111,310	May 5, 1992
Sullivan et al. (Sullivan '517)	5,214,517	May 25, 1993

The Rejections on Appeal

Claims 2-4, 12-14 and 18 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite (Paper No. 13).

Claims 1-7 and 11-18 stand rejected under 35 U.S.C. § 102 as being anticipated by Sullivan '501 (Paper No. 13).

Claims 1-7 and 11-18 stand rejected under 35 U.S.C. § 103 as being unpatentable over Daly or Sullivan '517, in view of Parker (Paper No. 13). The appellant erroneously indicates in his brief that claim 8 also stands rejected under 35 U.S.C. § 103. Instead, claim 8 has merely been objected to as being dependent on rejected claim (Paper No. 13).

The Invention

The invention is directed to a digital image processing method and apparatus for halftoning, i.e., simulating a continuous tone image by patterns of dots and no dots which the eye perceives as a representation of a certain gray-scale level. Each pattern corresponds to one density level, and the set of

patterns is generated simultaneously by minimizing an ensemble cost function.

Representative claims 1 and 11 are reproduced below:

1. Method for generating a halftone image with a computer comprising:

providing a set of correlated minimum visual modulation two-dimensional binary patterns, each pattern corresponding to one density level of a digital input signal, the set of patterns being generated simultaneously by minimizing an ensemble cost function which is the variance of non-zero spatial frequencies weighted by a human visual system modulation transfer function; and

modularly addressing the patterns to select bits to form the halftone pattern.

11. Halftoning apparatus comprising:

digital scanner means for generating from source material a digital signal representing density levels (gray levels) of pixels in the source material;

computer means programmed to operate upon the digital signal from the scanner to generate a set of correlated minimum visual modulation two-dimensional binary patterns, each pattern corresponding to one density level of the digital input signal, the set of patterns being generated simultaneously by minimizing an ensemble cost function which is the variance of non-zero spatial frequencies weighted by a human visual system modulation transfer function; the computer further programmed to address modularly the patterns to select bits to [sic] from the halftone pattern; and

marking engine means driven by the computer to create a halftone image.

Opinion

The indefiniteness rejection of claims 2-4, 12-14, and 18 under 35 U.S.C. § 112, second paragraph

Holding that a claim is unpatentable for indefiniteness under 35 U.S.C. § 112, second paragraph, requires a determination that one with ordinary skill in the art would not understand the scope of what is being claimed. See, e.g., Amgen Inc. v. Chugai Pharmaceutical Co. Ltd., 927 F.2d 1200, 1217, 18 USPQ2d 1016, 1030 (Fed. Cir. 1991). A claim needs to "reasonably apprise" those skilled in the art as to the scope of what is claimed. See, e.g., Shatterproof Glass Corp. v. Libbey-Owens Ford Co., 758 F.2d 613, 624, 225 USPQ 634, 641 (Fed. Cir. 1985). More importantly, the breadth of a claim is an entirely different issue from indefiniteness. In re Miller, 441 F.2d 689, 693, 169 USPQ 597, 600 (CCPA 1971); In re Gardner, 427 F.2d 786, 166 USPQ 138 (CCPA 1970). Breadth does not equate to indefiniteness. E.g., In re Borkowski, 422 F.2d 904, 909, 164 USPQ 642, 646 (CCPA 1970).

In this case, the examiner erred by equating breadth with indefiniteness. As to claims 2-4 and 12-14, the examiner's position is stated as follows (answer at 3):

> Claims 2-4 and 12-14 recite "a combinatorial minimization technique", "stochastic annealing" and "a genetic algorithm" respectively. However, the claims fail to clearly define such limitations in the claims.

> It is not clear as [to] how the combinatorial minimization techniques are performed.

Based on the foregoing, it is not evident why the examiner found that the terms "combinatorial minimization technique," "stochastic annealing," and "genetic algorithm" have to be more clearly explained in the claims. It is not the function of claims to define the meaning of terms. Rather, that is the role of the written specification.

The following discussion in the examiner's answer at page 4 reveals more what the examiner had in mind:

> Appellant['s] argument is not persuasive. The "stochastic annealing" and "a genetic algorithm" are broad terms well known in the art. There are different methods for performing such "stochastic annealing" and "a genetic algorithm" functions. The claims are interpreted in the broad sense that appellant is intended to claim all the "stochastic annealing" and "a genetic algorithm" methods instead of the particular method as disclosed in the specification. The claims fail to clearly define the "stochastic annealing" and "a genetic algorithm" methods as recited in the specification. Accordingly, the claims are considered as vague, and indefinite.

From the above-quoted explanation, it is evident that the examiner had no difficulty understanding what each of the terms means. Instead, the examiner found fault with the appellant's not limiting the claimed invention to any particular kind of stochastic annealing or a specific genetic algorithm. But that is confusing breadth with indefiniteness. With the broad

language in the claims, the claims would cover any kind of stochastic annealing and any type of genetic algorithm. The metes and bounds of the claimed invention are reasonably clear. The examiner's view that claims 2-4 and 12-14 are vague and indefinite is erroneous.

As for claim 18, the examiner is also erroneous in finding that the claim is vague and indefinite. On page 3 of the examiner's answer, it is stated:

> Claim 18 is rejected under 35 USC 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 706.03(f).

The above-quoted statement of the examiner fails to adequately set forth the basis of his finding that claim 18 is "incomplete for omitting essential steps." What is incomplete? Which essential steps have been omitted? Why are they essential? Absent such information, it cannot be said that the examiner has made out a prima facie case that claim 18 is vague and indefinite. On page 5 of the answer, when responding to the appellant's arguments, the examiner provided the following explanation:

> The claim is totally functional for the reasons that the claim recites "A method for . . . . ". Other than the for use function, there is no method step recited in the claim.

Thus, it appears that the examiner is not really of the view that certain particular or specific steps known to the examiner have been omitted from the claim. He does not indicate what are the so called missing steps. Rather, the examiner finds that claim 18 as a method claim actually includes "no" method step.

We disagree with the examiner that claim 18 contains no method steps. It should be noted that the appellant need not use words the examiner would prefer to use, or a claim format with which the examiner is more use to seeing or comfortable with.

Claim 18 is reproduced below:

> 18. A method for halftoning an image by modularly addressing an ensemble of two-dimensional binary patterns, each pattern corresponding to one density level of a digital image signal to select bits to form a halftone image, the ensemble of halftone patterns being correlated and having minimum visual modulation, the ensemble of patterns being generated simultaneously by minimizing an ensemble cost function.

In our view, claim 18 includes at least the following steps, written in alternative form:

1. modularly addressing an assemble of two-dimensional binary patterns;

2. correlating the ensemble of halftone patterns;

3. generating the ensemble of patterns simultaneously.

Each of the foregoing features is necessary before claim 18 can be said to be met or anticipated by any prior art reference. There are many ways to draft a method claim, including many ways to set forth the method steps required. We know of no authority which requires an applicant to begin each recital of a method step by the "ing" form of a verb.

In any event, it is not the case that a claim needs to recite each and every element needed for the practical utilization of the claimed subject matter. We follow the stated position in Hughes Aircraft Co. v. United States, 640 F.2d 1193, 1197, 208 USPQ 785, 789 (Ct. Cl. 1980), that a basic principle of patent law is that "it is not necessary to claim in a patent every device required to enable the invention to be used."

The rejection of claims 1-7 and 11-18 as being anticipated by Sullivan '501

In his answer on page 3, the examiner stated that the anticipation rejection of claims 1-7 and 11-18 "is set forth in the prior Office action paper number 13." In that connection, in Paper No. 13, which is the the final rejection of the claims, the examiner stated only (on page 2): "Claims 1-7, 11-18 are rejected under 35 U.S.C. § 102(b) as being clearly anticipated by Sullivan et al. '501." There, the examiner made no findings with respect to any rejected claim, except for finding (Paper No. 13, at 4) that "the use of 'simultaneously' function as recited in the claims is old as shown by Sullivan et al '501." For the anticipation rejection under 35 U.S.C. § 102, no other feature of any rejected claim was addressed in the final Office action, even though each claim includes various other features.

Section 102 of Title 35, United States Code begins:

"A person shall be entitled to a patent unless -- ."

The language is not ambiguous but quite clear. The examiner has the initial burden of establishing prima facie anticipation by coming forward with evidence tending to disprove novelty. In re Wilder, 429 F.2d 447, 450, 166 USPQ 545, 548 (CCPA 1970). A prima facie case means the evidence of prior art would reasonably allow the conclusion the examiner seeks and compels such a conclusion if the applicant produces no evidence or argument to rebut it. In re Spada, 911 F.2d 705, 707 n.3, 15 USPQ2d 1655, 1657 n.3 (Fed. Cir. 1990).

"Rejection for anticipation or lack of novelty requires, as the first step in the inquiry, that all the elements of the claimed invention be described in a single reference." In re Spada, 911 F.2d 705, 707 n.3, 15 USPQ2d 1655, 1657 n.3 (Fed. Cir. 1990). Anticipation of a claim under § 102 can be found only if the prior art reference discloses every element of the claim. In re King, 801 F.2d 1324, 1326, 231 USPQ 136, 138 (Fed. Cir. 1986). In that regard, note also that what a reference discloses is a question of fact. Panduit Corp. v. Dennison Mfg. Co., 810 F.2d 1561, 1579 n.42, 1 USPQ2d 1593, 1606 n.42 (Fed. Cir.), cert. denied, 481 U.S. 1052 (1987).

Without findings from the examiner on just how Sullivan '501

discloses or describes every feature of any rejected claim, it cannot be said that a prima facie case of anticipation has been established for that claim. In this case, that is true for all of claims 1-7 and 11-18. Without the necessary findings and

explanations on how each claim reads on Sullivan '501, the examiner's holding of anticipation is without basis.

In the absence of a prima facie case of anticipation, the appellant is under no obligation to set forth any counter argument or rebuttal evidence. The burden has not shifted to the appellant to make such a response, and reasonably so. Without the examiner's initial findings, there is no target or point with which the appellant can take issue with. To shift the burden to the appellant under such a circumstance to identify features which he contends are not disclosed by the allegedly anticipatory reference is tantamount to requiring the appellant to demonstrate patentability, contrary to the principle of 35 U.S.C. § 102. Moreover, procedural due process and 35 U.S.C. § 132 of the patent statute require that applicants be adequately notified of the reasons for the rejection of claims so that they can decide how to proceed. In re Ludtke, 441 F.2d 660, 662, 169 USPQ 563, 565 (CCPA 1971). Accordingly, we do not take the view that the appellant has conceded a lack of novelty of all claim features the appellant happens to not have addressed in the appeal brief. Instead, for the foregoing reasons, we conclude that the examiner has failed to put forth a prima facie case of lack of novelty.

In the alternative, even if it is assumed that all features

except the simultaneous function have been conceded by the appellant, the several findings made by the examiner as to the "simultaneous generation" feature for the correlated bit patterns are erroneous. In the answer at 6, the examiner stated:

> Sullivan et al further disclose at column 6 lines 6-11 that "A computer program, written in the fortran program language, for performing the above steps is included in Appendix A. This program was executed on a CRAYII TM super computer to produce a set of 256 minimum visual noise binary bit patterns, corresponding to 256 density levels." Sullivan et al clear[ly] disclose the "simultaneously" function as recited in the claims.

Furthermore, on page 7 of the answer, the examiner stated:

> The prior art Sullivan et al '501 show in figures 3, 6, and 8 the simultaneously function as relied by the appellant. Sullivan et al '501 also disclose the use of CRAYII TM super computer to produce a set of 256 minimum visual noise binary patterns, which is the same as the super computer as disclosed by the appellant. Accordingly, the claims are not patentable over Sullivan et al '501.

The appellant is correct that the examiner's reading of the figures of Sullivan '501 is wrong and that the examiner has confused generation of the stored bit patterns with the making use of those stored bit patterns to generate a halftone image. As is correctly noted by the appellant in the reply brief at 2:

> Figures 6 and 8 show the halftone image processing technique using the halftone bit patterns, they do not show the bit patterns being generated simultaneously (Figure 3 is a graph showing the human visual response function). As described at Col. 6, line 33, the

> "graphics generator" 10 in Figure 6 is an input device such as a personal computer programmed to generate graphics, not a device to generate the bit patterns. . . . The generation of the bit patterns used in the memory 34 is described in the specification at Col. 5, line 42 to Col. 6, line 28.

We also agree with the appellant that there is nothing to show that the computer program in Appendix A of Sullivan '501 generates or calculates all of the bit patterns simultaneously. The fact that a supercomputer has been employed in Sullivan '501 does not mean the bit patterns are generated simultaneously. A supercomputer possibly may have sufficient computing power to generate the bit patterns simultaneously, but that does not constitute a teaching, for anticipation purposes, that simultaneous generation of bit patterns in fact is done. The examiner is erroneous in finding that Sullivan '501 "provides the 'simultaneously' function as recited in the claims" (supplemental answer at page 2).

For the foregoing reasons, we will reverse the rejection of claims 1-7 and 11-18 under 35 U.S.C. § 102 as being anticipated by Sullivan '501.

The rejection of claims 1-7 and 11-18 under 35 U.S.C. § 103 as unpatentable over Daly or Sullivan '517, in view of Parker

On page 4 of the answer, the examiner states that the obviousness rejection "is set forth in the prior Office action

paper number 13." In paper number 13, i.e., the final rejection, the examiner explained his prima facie case as follows (page 3):

> Claims 1-8, 11-18 are rejected under 35 U.S.C. § 103 as being unpatentable over Daly et al or Sullivan et al '517 in view of Parker et al.

> See the protest under 37 CFR 1.191(a) for detail[ed] explanation of the 35 USC 103 rejections.
>
> Although Daly, or Sullivan et al and Parker et al do not recite the set of patterns being generated sumultaneously, the program shows in Sullivan et al '517 indicating that the patterns can be generated by computer simultaneously. It would have been obvious to generate the patterns sumultaneously by a computer as recited in the claims.

Although the claims 1-8 and 11-18 are all different, the examiner referred to them as if they were the same by noting only a common difference between all of the rejected claims and the applied prior art. That is so despite the examiner's expressly ackowledging (answer at 3) that under Graham v. John Deere Co., 383 U.S. 1 (1966), the factual inquiries needed for establishing obviousness under 35 U.S.C. § 103 include "ascertaining the differences between the prior art and the claims at issue." Without having ascertained and made known the findings as to all differences between each claim and the prior art, the examiner could not have conducted an appropriate obviousness analysis under 35 U.S.C. § 103 for the claims. Neither can we simply regard that the burden has shifted to the applicant to point out differences between the claimed invention and the prior art and why the differences are not such that the claimed invention as a whole would not have been obvious over the applied prior art. The initial burden is on the examiner. We have a duty to ensure

that the burden has been reasonably discharged. It has not.

Although the examiner stated (Paper No. 13 at 3) "[s]ee the protest under 37 CFR 1.191(a) for [a] detail explanation of the 35 USC 103 rejection," the protest discusses an article by Sullivan et al. and not Sullivan '517 (U.S. Patent No. 5,214,517), and an article by Parker et al. and not Parker (U.S. Patent No. 5,111,310). At oral hearing, however, the appellant's counsel acknowledged that insofar as the obviousness rejection is concerned, the Sullivan article can be regarded as an equivalent of Sullivan '517 and the Parker article can be regarded as an equivalent of Parker.

The examiner has not made clear which alleged facts or contentions in the protest have been adopted by him as his own and why they would be relevant in the obviousness rationale as contemplated by the examiner. Some of the discussions in the protest do not have an immediately apparent significance in the context of the appellant's specific claims, such as that about use of a single value function. The protest also does not address any specific claims as amended. Explanations are necessary to work the general protest discussions into a specific ground of rejection directed to specific claims. In the circumstance here, saying that for a detailed explanation of the

obviousness rejection see the protest obfuscates and muddles the reasons underlying the obviousness conclusion. Note also that while the examiner's position as stated in his answer at the bottom of page 6 appears to be that the teaching in Sullivan '517 of the use of a supercomputer suggests simultaneous generation of bit patterns, the protest (pages 8 and 9) relies instead on Parker for suggesting that feature. That inconsistency further renders unclear as to what exactly is the examiner's position.

We now focus on the few findings and conclusions the examiner did make. All of the claims on appeal require the generation of a set of correlated two-dimensional binary patterns with each pattern corresponding to one density level of a digital input. All claims except claim 17 further specify that the patterns are simultaneously generated by minimizing an ensemble cost function. Claims 1 and 11, and the claims dependent thereon, further require that the ensemble cost function is the variance of non-zero spatial frequencies weighted by a human visual system modulation transfer function.

The examiner stated (final rejection at 3): "Although Daly, or Sullivan et al [Sullivan '517] and Parker et al do not recite the set of patterns being generated simultaneously, the program shows in Sullivan et al '517 indicating that the patterns can be

generated by computer simultaneously." The examiner further stated (final rejection at 3); "It would have been obvious to generate the patterns simultaneously by a computer as recited in the claims." Evidently, the rationale is the following, as is stated at pages 6-7 of the answer:

> Sullivan et al '517 disclose at column 6 lines 23-28 that "A computer program written in FORTRAN for implementing the minimization process is included in Appendix A. This program was executed on a CRAYX-MP/48 supercomputer to produce a set of 256 correlated minimum visual noise binary bit patterns, corresponding to 256 density levels." Since Sullivan et al show in figures 3 and 6 the pattern generation, and the use of "correlated" or "simultaneously" generation function provides the same result; it would have been obvious to use the supercomputer to perform the simultaneously generation function by minimizing an ensemble cost function as recited in the claims.

Directly addressing the foregoing points made by the examiner is the inventor's affidavit under 37 CFR § 1.132. The inventor Lawrence A. Ray is also a named co-inventor in Sullivan '517. The affidavit discusses facts which tend to undermine the examiner's conclusion that it would have been obvious to one with ordinary skill in the art from Sullivan '517 to generate the correlated patterns simultaneously. The affidavit further discusses matters which tend to contradict the conclusory statement in the protest that the sequential nature of bit pattern generation in Parker is merely routine optimization for

computational efficiency.

In light of the pertinent nature of the Rule 132 affidavit, which was submitted together with the appeal brief and was entered into the file as Paper No. 17, the absence of discussion by the examiner with respect to the affidavit cannot be excused. The examiner made no statement concerning this affidavit or any indication that the affidavit has been considered. If the examiner has considered the affidavit, he has not made known his positions with regard to the points made in the affidavit.

Moreover, to the extent the examiner based his determination on the thought that because simultaneous generation provides the same result as non-simultaneous generation, it would have been obvious to employ simultaneous generation, it does not sufficiently account for the necessary motivation to do tasks differently. The examiner has not provided sufficient evidence to demonstrate that simultaneous generation of bit patterns used for halftone imaging or a similar technology was an available option readily appreciated by one with ordinary skill in the art. In any event, the Rule 132 affidavit appears to indicate otherwise and the examiner has not addressed the Rule 132 affidavit.

For all of the foregoing reasons, the obviousness rejection

under 35 U.S.C. § 103 is not ripe for review. A remand is in order for the examiner to make findings on the differences between the claimed invention of each claim and the prior art, to make specific and clear the conclusions he draws and the rationale he relies on, and to consider and assess the Ray affidavit filed under 37 CFR § 1.132. And if the examiner will continue to rely on discussions in the protest, it should be explained (1) why a single value function would be amenable to simultaneous calculation and (2) what evidence exists to support the notion that one with ordinary skill in the art would be aware that one function can be used to calculate multiple bit patterns simultaneously in the field of halftoning. The protest itself does not constitute evidence but is merely attorney argument.

Conclusion

The rejection of claims 2-4, 12-14 and 18 under 35 U.S.C. § 112, second paragraph, as being indefinite is reversed.

The rejection of claims 1-7 and 11-18 under 35 U.S.C. § 102 as being anticipated by Sullivan '501 is reversed.

The rejection of claims 1-7 and 11-18 under 35 U.S.C. § 103 as being unpatentable over Daly or Sullivan '517, in view of Parker, is vacated and remanded for further examination by the examiner consistent with our opinion as set forth above.

This application, by virtue of its "special" status, requires an immediate action, MPEP 708.01(d). It is important that the Board be informed promptly of any action affecting the appeal in this case.

REVERSED AND REMANDED

JERRY SMITH Administrative Patent Judge	)	
JAMESON LEE Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
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