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Recent Development

RECENT DEVELOPMENTS IN PATENT LAW: MATHEMATICAL ALGORITHM PATENTABILITY -- A MAJOR AREA OF ACTIVITY

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I. Introduction

Many practitioners believe that the Patent and Trademark Office (PTO) has been ignoring the *Arrhythmia*[1] case. This term, an *en banc* panel of the Court of Appeals for the Federal Circuit (Federal Circuit) has rejuvenated *Arrhythmia,* and has expanded upon it in significant ways. This summer's opinions in *Alappat,*[2] *Warmerdam,*[3] and *Lowry*[4] appear to have provided strong support ***34** for the patentability of standard computing machinery controlled by novel software to produce some sort of unique "data structure."

Alappat was in part an outgrowth of *In re Donaldson,*[5] decided last February. That was the case requiring the Patent Office to

apply paragraph six of 35 U.S.C. § 112, to patentability determinations.[6]

Among other significant developments is the opinion in *Amsted*[7] declaring inadequate for actual notice a letter that purported to notify the entire industry of a patent.[8] In the *Amsted* case, barring proper marking, the defendant's knowledge of the patent or of its infringement was declared irrelevant in the absence of a letter specifically charging infringement and specifying an infringing device.[9]

While *Alappat* and *Amsted* probably contain the most surprising developments over the summer, there were also interesting opinions relating to claim interpretation, inventorship, public use, obviousness, equivalents, and attorney misconduct.

II. Patentability of Mathematical Algorithms

A. *In re Alappat*

In re Alappat is an *en banc* case subscribed to by six judges holding that software with a data array as final product can be a patentable invention.[10] The opinion is written by Judge Rich.

Alappat's invention relates to a "means for creating a smooth waveform display in a digital oscilloscope."[11] "An input signal to the oscilloscope is sampled and digitized to provide a waveform data sequence (vector list), wherein each successive element of the sequence represents the magnitude of the waveform at a successively later time."[12] "The waveform data sequence is then processed to provide a bit map, which is a stored data array indicating which pixels are to be illuminated."[13] Alappat's invention employs an anti-aliasing system to eliminate any "apparent discontinuity, jaggedness, or oscillation in the waveform" display resulting from the vector list.[14]

Because claim 15 was written completely in "means for" language and because these means clauses were thought to read broadly in the PTO to encompass each and every means for performing the recited functions, claim 15 was held to amount to nothing more than a process claim wherein each means clause represents only a step in that process.[15] The Board believed that each of the steps in the ***35** postulated process claim recited a mathematical operation, whose steps combine to form a "mathematical algorithm for computing pixel information," and that, "when the claim is viewed without the steps of this mathematical algorithm, no other elements or steps are found."[16] The majority of the Board therefore concluded that the claim was directed to nonstatutory subject matter.[17] Not stopping there, the Board asserted that even if statutory subject matter were claimed, and even if 35 U.S.C. § 112, paragraph six (hereinafter "§ 112 ¶ 6") were applied in the PTO as it has been applied in interparties litigation, never-the-less, any stored program digital computer was within the § 112 ¶ 6 range of equivalents of the structure disclosed in the specification.[18] Thus, claim 15 not only claimed nonstatutory subject matter if § 112 ¶ 6 were not applied, it would fail for lack of novelty if § 112 ¶ 6 were applied. The en banc panel rescued this patent from an apparent catch-22.

The Federal Circuit held that the independent claim recited a special purpose rasterizer machine made up of "at the very least, the specific structures disclosed in Alappat's specification corresponding to the means-plus-function elements (a)-(d) recited in the claim."[19] As such a machine, the claim is directed to patentable subject matter enumerated in section 101.[20]

As justification, the Federal Circuit wearily reminded the Board that the rules of claim construction in infringement actions do not differ from the rules for claim interpretation during prosecution in the PTO. When the means clauses in the broad claim are construed pursuant to 35 U.S.C. § 112 ¶ 6, as corresponding to the respective structures disclosed in the specification of Alappat's application, the claim as a whole is directed to a machine and thus to statutory subject matter named in section 101.[21]

Sidestepping the issue of whether the mathematical subject matter exception to section 101 can apply to true apparatus claims, the Court held that the claimed subject matter in this case does not fall within that exception.[22] The subject matter as a whole was not considered to be a disembodied mathematical concept. The claimed invention as a whole was considered to be directed to "a combination of interrelated elements which combine to form a machine for converting discrete waveform data samples into anti-aliased pixel illumination intensity data to be displayed on a display means."[23]

The court left open the possibility that a set of means elements that function to transform one set of data to another through a series of mathematical calculations could constitute nonstatutory subject matter.[24] But, it appears that such a situation exists only where there is lack of structure disclosed in support of those means elements. Means elements supported by disclosure of structure result in a statutory claim, because such claims are limited to the use of a particularly claimed combination of ***36** elements performing a particularly claimed combination of calculations resulting in a transformation of some particular kind.

The Federal Circuit was careful to point out that the mere addition of an express hardware limitation does not save an otherwise non-statutory means combination. In this connection, the Federal Circuit pointed out that the claim in its previous *Iwahashi*[25] opinion included properly supported means elements, as well. "It was not the ROM alone that carried the day."[26]

In some prior software patent cases before the Federal Circuit, certain claimed "means" elements had been found to be nothing more than process claims in the guise of apparatus claims.[27] The Federal Circuit distinguished these cases because in them "the apparent lack of any supporting structure in the specification corresponding to the claimed 'means' elements" necessitated the conclusion that the claims were in effect process claims.[28] In contrast, the *Alappat* application disclosed adequate supporting structure.[29]

The Federal Circuit took the trouble to substitute into each claim specific references to disclosed hardware items that supported each use of the term "means" in the claims. These hardware items included an ALU, barrel shifters, and a ROM. It is interesting to note that these substitutions appear to have been based upon the language of dependent claims. This leads to an interesting question: If the independent claim is limited to the scope of the specification under § 112 ¶ 6, is it possible that the dependent claims are broader than the independent claim? Alternatively, is the independent claim only as broad as the four dependent claims read conjunctively? Logically, this would indeed be the case. In fact, the five claims would each be co-extensive. However, things are not always logical in the art of patent interpretation. The court's statement, "Each of dependent claims 16-19 is in fact limited to one of the structures disclosed in the specification,"[30] is mysterious in view of law requiring that the different rules of interpretation apply to non-" means" elements.

As for lack of novelty, it was determined that a general purpose computer programmed to carry out the claimed invention would be a new machine.[31] In general, this case establishes as law the proposition that a computer operating pursuant to software may represent patentable subject matter, provided, of course, that the claimed subject matter meets all the other requirements of Title 35. It appears that a very important one of those requirements, at least in the case of means-plus-function claims, is that there be adequate hardware structural support set forth in the specification.

37 B. *In re Warmerdam

In re Warmerdam relates to a method for generating a "data structure" and a general purpose computer having a memory containing that data structure.[32] The data structure represented a set of artificial circular boundaries for a collision avoidance system. When claimed in the format of a method claim, the Federal Circuit determined that the claimed data structure "involves no more than the manipulation of abstract ideas" and is thus nonstatutory subject matter.[33] However, the same method steps when claimed in product by process format were not challenged as nonstatutory or lacking in novelty by the Board below. The language: "A machine having a memory which contains data representing a bubble hierarchy generated by the method of any of method Claims 1 through 4,"[34] was held to be sufficiently definite over a contrary Board determination.[35]

Since the Board had conceded that claim 5 with its mere reference to a machine was statutory, the Federal Circuit did not have the opportunity to put its seal of approval on this use of a product by process claim format to convert nonstatutory method steps into statutory subject matter. In fact, the Federal Circuit restricted its opinion to the issue of definiteness and specifically declined to express an opinion on the patentability of this claim. Further, the Federal Circuit sustained the Board's determination of non-statutory subject matter when the words referring to a machine in claim 5 were replaced with the words "a data structure" in claim 6. The Federal Circuit held that the phrase "data structure" as used in claim 6 "does not imply a physical arrangement of the contents of a memory."[36]

In view of *Alappat*'s subtle warning that mere addition of an express hardware limitation does not save an otherwise non-statutory means combination,[37] it is interesting to speculate about the reason for the Board's failure to fight claim 5 in *Warmerdam.* The absence of §112 ¶6, considerations in *Warmerdam* must be the key to understanding this failure.

The wording of this decision is consistent with a theory that the Federal Circuit will not accept as statutory a product-by-process claim where the process is found to be a nonstatutory algorithm, even if reference is made to a machine. While the patent will have to be obtained to determine the amount of structural detail contained in the specification, there is some indication in the Federal Circuit decision that specific hardware to be used was not set forth in the application specification. If not, the use of mean-plus-function claim format might have resulted in a determination of non-statutory matter in this case, as would be suggested by this writer's reading of the *en banc* decision in the *Alappat* case.

C. *In re Lowry*

In re Lowry relates to storage, use, and management of information residing in a memory.[38] The Federal Circuit reversed the Board's affirmance of the Examiner's rejection under sections 102 and 103 ***38** (novelty and obviousness). The applicant's data structure comprised "a plurality of attribute data objects (ADO's) stored in memory."[39] The Board below had reversed the Examiner's rejection as nonstatutory claims drawn to "a memory for storing data for access by an application program being executed on a data processing system . . . "[40] where the limitations related only to a data structure including ADOs.[41] So the issue of statutory subject matter status of such claims was not developed by the Federal Circuit. Issues before the Federal Circuit included the novelty of claims including limitations relating to a central processing unit (CPU) and memory *means.*

To be more specific, the Board's issue was framed as "whether a new, nonobvious functional relationship exists between the printed matter [data structure with ADOs] and the substrate [memory]."[42] The Board found that the applicant did not establish such a functional relationship. Reversing, the Federal Circuit asserted that "ADOs contain both information used by application programs and information regarding their physical interrelationships within a memory."[43] Because the claims "dictate how application programs manage information," the claims "define functional characteristics of the memory."[44] Further, "the claims require specific electronic structural elements which impart a physical organization on the information stored in memory."[45] In fact, the Federal Circuit noted that "a collection of bits having information about relationships between ADOs . . . is the essence of electronic structure."[46] The data structures were held to be "specific electrical or magnetic structural elements in a memory."[47] This established, it was apparently easy to see that the PTO "did not establish that ADOs, within the context of the entire claims, lack a new and nonobvious functional relationship with the memory."[48] The Federal Circuit assigned as error the PTO's failure to give patentable weight to the data structure claim limitations.

As the reader can see, *In re Lowry* involves a claim that satisfies the deficiency found in *In re Warmerdam.* When data structures impose a physical organization on memory, such structures are patentable over prior art teaching information content in memory. While the status of the data structure claims as statutory subject matter was not an issue on appeal, the court uses reasoning that would support subject matter patentability for such claims.

D. *In re Schrader*

In re Schrader preceded *Alappat* and relates to patent claims directed to a method for competitively bidding on a plurality of related items, such as contiguous tracts of land.[49] There appears ***39** to have been no disclosure of computing machinery. The Federal Circuit held that such claims were properly rejected for lack of statutory subject matter, since a mathematical algorithm is implicit in the claim, and mere entry of bids into a "record" is insufficient to establish patentability. "Schrader's claims, except for incidental changes to a "record," do not reflect any transformation or conversion of subject matter representative of or constituting physical activity or objects."[50]

The applicant argued that the claim "recites or implies"[51] sufficient physical activity. The applicant evoked the image of bidders assembled in a single location in front of a display or in remote locations communicating by closed circuit television.[52] Dismissing this image as outside of the claim language, the Federal Circuit found that "the grouping or regrouping of bids cannot constitute a physical change, effect, or result."[53] Since the terms "bid data," "completion data," or "display data" were not found in the claims, the Federal Circuit could not find in the claim any kind of data transformation.[54]

It is interesting to note that Judge Newman dissented. She would have found the auction claims statutory and would have remanded for further consideration under sections 102 and 103.[55]

III. Claim Interpretation Matters in PTO Prosecution, Summary Judgment, and Reexamination

A. *In re Donaldson Co., Inc.*

In re Donaldson Co., Inc. relates to a claim for an industrial air-filtering device.[56] One limitation was recited as follows: "means [24], responsive to pressure increases in said chamber [22] caused by said cleaning means [65], for moving particulate matter in a downward direction . . . "[57] The applicant conceded that there was a prior art reference that taught every element in the claim at issue, except for the quoted means limitation.[58] This limitation was supported by disclosure of a "flexible sloping surface" not shown in the prior art reference. The Board asserted that "particular features or limitations appearing in the specification are not to be read into the claims of an application"[59] and refused to interpret the claim limitation to require a flexible sloping surface.

Reversing, the Federal Circuit pointed out that there is nothing in § 112 ¶ 6 that suggests that the PTO is exempt from its mandated interpretation of means-plus-function language in light of corresponding structure, material, or acts described in the

specification.[60] The statute makes no ***40** distinction "between prosecution in the PTO and enforcement in the courts, or between validity and infringement."[61] Therefore, the Federal Circuit held that the statute applies regardless of the context.[62]

The court was quick to defend the general principle that "claims are to be given their 'broadest reasonable interpretation' during prosecution."[63] However, it held that "the 'broadest reasonable interpretation' that an examiner may give means-plus-function language is that statutorily mandated by paragraph six."[64] Also, the Court reiterated the requirement that a claim "particularly point out and distinctly claim" the invention.[65] "Therefore, if one employs means-plus-function language in a claim, one must set forth in the specification an adequate disclosure showing what is meant by that language."[66] This precaution resonates throughout the *Alappat* decision discussed above. It also seems to be a factor in the Board's decision to take a stand on definiteness in *Warmerdam.*

Another aspect of the *Donaldson* case is the need to draw a fine line between "impermissibly imputing limitations from the specification into a claim" and "properly referring to the specification to determine the meaning of a particular word or phrase."[67] The Federal Circuit asserted that, in this case, it was dealing with "the construction of a limitation already in the claim in the form of a means-plus-function clause and a statutory mandate on how that clause must be construed."[68]

B. *Lantech, Inc. v. Keip Mach. Co.*

The *Lantech* case relates to a claim interpretation involved in a trial court summary judgment granted on a finding of literal infringement.[69] The Federal Circuit found that the summary judgment was wrongly based on a finding that there were two or more moving surfaces in the accused device, whereas the claim properly interpreted required a finding of two or more conveyors.[70] The Federal Circuit found that the district court "erred as a matter of law by effectively reading out a specific and clearly stated limitation"[71] by accepting an interpretation of the term conveyor which was too abstract. When properly construed, said the Federal Circuit, "the claims require at least two conveyors which are separate elements and not merely two moving surfaces."[72] The key to the distinction between "moving surfaces" and "conveyors" was that a "conveyor necessarily includes components such as belts, slider plates, and drives, in addition to a moving surface."[73] The Federal Circuit said that the district court "failed to ***41** distinguish between two separate conveyors and a single conveyor with two moving surfaces going in the same direction."[74]

The failure of the court to allow an abstracted interpretation of the term "conveyor" may follow from the use in the claim of the "M" word, "means." The claim read in relevant part: "said conveyor assembly [14] comprising at least two conveyor means [92, 94] . . . "[75] However, there was no reference to § 112 ¶ 6 in the opinion. The Court was content to rely upon an elaboration of the meaning of the phrase "at least two" as found in the claims.

C. *In re Paulsen*

In re Paulsen relates to a reexamination and the allowability of a claim containing the word "computer" in its preamble and defining a folding LCD screen on a portable computer when compared to a Japanese reference disclosing a "calculator" having the same folding configuration.[76] In pertinent part, the broad claim in issue read as follows:
"A portable computer constructed to be contained within an outer case for transport and to be erectable to a viewing and operating configuration for use, said computer comprising a base, a display housing, a top cover, a rear cover, hinge means for permitting swinging movement of the display housing about an axis of rotation adjacent the rear end of the display housing . . . and including a keyboard in the portion of the base which is exposed by the movement of the display housing to the erected position."[77]

The applicant on reexamination basically argued that (1) "the Board erred in construing the term 'computer' broadly to encompass a calculator such as that disclosed [in the Japanese reference],"[78] and (2) that the Japanese reference (hardly more than a bare bones drawing) was a non-enabling reference in that it would not have suggested ways to obtain the functionality of a computer to a person of ordinary skill in the art.[79]

There was authoritative lexicographic support for considering a calculator to be a particular type of computer to those of ordinary skill in the art.[80] However, the patent owner asserted that the inventor's own definition of "computer" should prevail.[81] According to the inventor's definition, a computer would have a display with graphics and text capability, sufficient data processing capacity, communications ports, a telephone connection, and other features not normally present in a calculator.[82]

The Federal Circuit determined that the term "computer" was a necessary limitation to the claims, then conducted a de novo

construction of the term "computer" to ascertain its scope and meaning.[83] The Federal Circuit found that the patent owner was engaging in a post hoc attempt to ***42** redefine the claimed invention by impermissibly incorporating language appearing in the specification into the claims.[84]

The Federal Circuit distinguished between using the specification to interpret a word and adding an extraneous limitation appearing in the specification "wholly apart from any need to interpret . . . particular words or phrases in the claim."[85] The Federal Circuit then sought to prove that there was no need to interpret the word "computer" because it was an "ubiquitous term" commonly understood to those skilled in the art.[86] The Federal Circuit relied on *National Advanced Sys., Inc. v. United States,* as authority that "at the most fundamental level, a device is a computer if it is capable of carrying out calculations."[87]

The Federal Circuit recognized that an inventor is free to define the specific terms used to describe his or her own invention. However, the Federal Circuit asserted that any uncommon meaning that an inventor might seek to assign to a term must be made in a manner "so as to give one of ordinary skill in the art notice of the change."[88] Instead, the Federal Circuit opined that "the specification of the '456 patent does not clearly redefine the term 'computer' such that one of ordinary skill in the art would deem it to be different from its common meaning."[89]

In response, to the argument that the Japanese reference was not enabling in that it "only discloses a box for a calculator and thus does not teach how to make and use a portable calculator," the Federal Circuit noted that a prior art reference must be considered together with the knowledge of one of ordinary skill in the pertinent art.[90] The Board found that the level of skill to which the Japanese reference was addressed was very advanced at the time the patent containing the claim in issue was filed and that "one of ordinary skill in the art certainly was capable of providing the circuitry necessary to make the device operable for use as a computer."[91]

Other issues raised included the application of arguably non-analogous prior art references to the patentability of the claimed hinge combination.[92] In response the Federal Circuit noted that the hinge problems encountered by the inventors were problems that were not unique to portable computers and that references dealing with such articles as cabinets and washing machines could be pertinent prior art for solving the problem of how to connect and secure the computer's display housing to the computer while meeting certain size constraints and functional requirements.[93] In essence, the court seemed to be saying that this was nothing more than a hinge patent.

With respect to secondary considerations, the Federal Circuit found the evidence of commercial success impressive. However, it also found that the patent owner had not proven a sufficient relationship ***43** between that evidence and the patented invention.[94] Because the patent owner had limited his argument respecting evidence of commercial success to independent claims that were unpatentable under section 102 and failed to tie secondary considerations to the dependent claim, the Federal Circuit held that the patent owner did not establish that the commercial success, copying and professional recognition were probative of the non-obviousness of the dependent claims.[95] The Federal Circuit pointed out that secondary considerations must be shown to be relevant to the additional limitations of the dependent claims and not attributable to extraneous factors such as advertising and marketing or to the features possessed by computers defined by the anticipated independent claims.[96]

So ends the saga of the "Great Hinge Patent," formerly owned by Tandy Corporation. Evidence of commercial success, copying, and professional recognition included cumulative sales of $489 million in addition to licensing royalties of $7.5 million.[97]

IV. Notice of Infringement and Related Matters

A. *Amsted Indus., Inc. v. Buckeye Steel Castings Co [Amsted II].*

Amsted Industries analyzes actual notice and willfulness with respect to the infringement of a patent claiming a center plate in combination with several other components to form a railroad car underframe structure.[98] More particularly, it relates to the requirements that must be met to prove actual notice for purposes of 35 U.S.C. § 287(a) in absence of marking. The Federal Circuit held that such notice must be of "the infringement," and not merely of the patent's existence or ownership.[99] Thus, a form letter which was sent to numerous members of a particular industry, including defendant, advising of plaintiff's ownership of the patent, and which generally warned the members of the industry not to infringe, did not give the defendant "notice" as required by section 287. As a consequence, an award of enhanced damages on a finding of willful infringement was limited to the time period following the receipt, three years later, of a second and more specific letter. Interestingly, the Federal Circuit asserted that it "is irrelevant . . . whether the defendant knew of the patent or knew of his own infringement."[100]

The rationale for this holding is that the United States Supreme Court in *Dunlap v. Schofield*[101] established the principle that "notice must be an affirmative act on the part of the patentee which informs the defendant of his infringement."[102] Based on this principle, the Federal Circuit asserted that "[a]ctual notice requires the affirmative communication of a specific charge of infringement by a specific accused product or device."[103] The Federal Circuit held that a 1986 letter from the plaintiff was "merely ***44** informational, of the kind that companies often sent to others without intending to charge infringement."[104] Significant wording from the 1986 letter is as follows: "You should not offer to supply items which are copies of or designed to replace our LOW PROFILE center plate."[105] The plaintiff argued that the "notice provision does not require the patentee to identify an accused device, but only to inform the defendant of the type of product that would infringe."[106]

By implication, it appears that a notice letter must be sufficient to justify a declaratory judgment action before damages begin to run. The receipt of such a letter would also be required before the accused infringer begins to have an affirmative duty of due care, which will normally entail obtaining competent legal advice. If this last is a correct surmise, accused infringers need not worry about getting an opinion letter until a properly worded notice letter arrives.

One is left to wonder what guidance the Federal Circuit would give to a patentee who wants to give notice to an accused infringer whose product line changes every six months. For example, if a notice letter specifies a set of gates within a semiconductor component used in a larger system, and that system is replaced six months later by another system containing a semiconductor component from a new vendor with a different arrangement of gates, has there been actual notice? It looks like proper marking of product sold for or under the patentee is the only reliable vehicle for actual notice in such a situation.

This opinion also contains some interesting observations about the efficacy of attorney opinion letters. However, the discussion does not illuminate the law in any new and interesting ways.

B. *Amsted Indus., Inc. v. Buckeye Steel Castings Co.*

This is a separate opinion from that just discussed. It stands for the proposition that expert witness fees may *not* be included among "reasonable attorney fees" imposed upon the loser in a patent infringement lawsuit under 35 U.S.C. § 285.[107] In sum, there does not seem to be an appropriate circumstance for the imposition of expert fees exceeding the $40 per day attendance fee set forth in 28 U.S.C. § 1821(b), unless the losing party commits "acts which degrade the judicial system."[108] In the latter instance, a court could fall back on its inherent power to administer sanctions, but only after attempting to remedy misconduct by statutory and rules sanctions. The Federal Circuit said, "To the extent that this court's prior precedents hold that section 285 authorizes an award of expert witness fees, *West Virginia University* overruled them."[109]

*45 V. Conclusion

The summer term of the Federal Circuit was full of useful guidance with respect to mathematical algorithms, claim interpretation, and the requirements for actual notice of infringement. While there were other interesting cases, none seemed as important or useful as those set forth above.

As for mathematical algorithms, the *Freeman-Walter-Abele*[110] test was not abandoned. However, the PTO was compelled to recognize the applicability of 35 U.S.C. § 112 ¶ 6 to software related means-plus-function claims. This result was perhaps predictable after the *Donaldson* decision last February. However, the PTO seems to have significantly scaled back the use of "non-statutory subject matter" rejections in its efforts to contain software patent proliferation. It appears that wherever the claims make any reference whatsoever to a machine, the patentability battle will be fought over section 112 definiteness requirements. It is too early to say whether the recitation of "data structure" in a claim will have a similar talismanic effect.

Footnotes

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1 Arrythmia Research Technology Inc. v. Corazonix Corp., 958 F.2d 1053, 22 U.S.P.Q.2d (BNA) 1033 (Fed. Cir. 1992).

2 In re Alappat, 33 F.3d 1526, 31 U.S.P.Q.2d (BNA) 1545 (Fed. Cir. 1994).

[3] In re Warmerdam, 31 U.S.P.Q.2d (BNA) 1754 (Fed. Cir. 1994).

[4] In re Lowry, 32 F.3d 1579, 31 U.S.P.Q.2d (BNA) 1031 (Fed. Cir. 1994).

[5] In re Donaldson Co, Inc., 16 F.3d 1189, 29 U.S.P.Q.2d (BNA) 1845 (Fed. Cir. 1994).

[6] 16 F.3d at 1194, 29 U.S.P.Q.2d at 1850.

[7] Amsted Indus., Inc. v. Buckeye Steel Castings Co., 24 F.3d 178, 30 U.S.P.Q.2d (BNA) 1462 (Fed. Cir. 1994).

[8] 24 F.3d at 187, 30 U.S.P.Q.2d at 1469.

[9] *Id.*

[10] In re Alappat, 33 F.3d 1526, 31 U.S.P.Q.2d (BNA) 1545 (Fed. Cir. 1994).

[11] 33 F.3d at 1537, 31 U.S.P.Q.2d at 1551.

[12] 33 F.3d at 1537, 31 U.S.P.Q.2d at 1552.

[13] *Id.*

[14] *Id.*

[15] *Alappat,* 23 U.S.P.Q.2d (BNA) 1340, 1345 (Bd. Pat. App. & Int. 1992).

[16] 23 U.S.P.Q.2d at 1345, 1346.

[17] 23 U.S.P.Q.2d at 1346.

[18] 23 U.S.P.Q.2d at 1345.

[19] *Alappat,* 33 F.3d at 1541, 31 U.S.P.Q.2d at 1555.

[20] 33 F.3d at 1542, 31 U.S.P.Q.2d at 1555.

[21] 33 F.3d at 1541-42, 31 U.S.P.Q.2d at 1554-55.

[22] 33 F.3d at 1542, 31 U.S.P.Q.2d at 1556.

[23] 33 F.3d at 1544, 31 U.S.P.Q.2d at 1557.

[24] 33 F.3d at 1544, 31 U.S.P.Q.2d at 1558.

[25] In re Iwahashi, 888 F.2d 1370, 1375, 12 U.S.P.Q.2d (BNA) 1908, 1912 (Fed. Cir. 1990)

[26] *Alappat,* 33 F.3d at 1544 n.24, 31 U.S.P.Q.2d at 1558 n.24.

[27] 33 F.3d at 1540-41, 31 U.S.P.Q.2d at 1554-55.

[28] *Id.*

[29] *Id.*

[30] *Id.*

[31] 33 F.3d at 1545, 31 U.S.P.Q.2d at 1558.

[32] In re Warmerdam, 31 U.S.P.Q.2d (BNA) 1754 (Fed. Cir. 1994) (opinion by Judge Plager).

[33] 33 F.3d at 1360, 31 U.S.P.Q.2d at 1759.

[34] 33 F.3d at 1358, 31 U.S.P.Q.2d at 1757.

[35] 33 F.3d at 1361, 31 U.S.P.Q.2d at 1760

[36] 33 F.3d at 1362, 31 U.S.P.Q.2d at 1760.

[37] *Alappat,* 33 F.3d at 1544 n.24, 31 U.S.P.Q.2d at 1558, n.24.

[38] In re Lowry, 32 F.3d 1579, 31 U.S.P.Q.2d (BNA) 1031 (Fed. Cir. 1994) (opinion by Judge Rader).

[39] 32 F.3d at 1580, 31 U.S.P.Q.2d at 1032.

[40] 32 F.3d at 1581, 31 U.S.P.Q.2d at 1033.

[41] 32 F.3d at 1582, 31 U.S.P.Q.2d at 1033.

[42] *Id.*

[43] 32 F.3d at 1583, 31 U.S.P.Q.2d at 1034.

[44] *Id.*

[45] *Id.*

[46] *Id.*

[47] 32 F.3d at 1583-84, 31 U.S.P.Q.2d at 1035.

[48] 32 F.3d at 1584, 31 U.S.P.Q.2d at 1035.

[49] In re Schrader, 22 F.3d 290, 30 U.S.P.Q.2d (BNA) 1455 (Fed. Cir. 1994).

[50] 22 F.3d at 294, 30 U.S.P.Q.2d at 1459.

[51] 22 F.3d at 293, 30 U.S.P.Q.2d at 1458.

[52] *Id.*

[53] 22 F.3d at 294, 30 U.S.P.Q.2d at 1458.

[54] *Id.*

[55] 22 F.3d at 296, 30 U.S.P.Q.2d at 1460.

[56] In re Donaldson Co., Inc., 16 F.3d 1189, 29 U.S.P.Q.2d (BNA) 1845 (Fed. Cir. 1994).

[57] 16 F.3d at 1191, 29 U.S.P.Q.2d at 1847.

[58] 16 F.3d at 1192, 29 U.S.P.Q.2d at 1848.

[59] *Id.*

[60] 16 F.3d at 1193, 29 U.S.P.Q.2d at 1848.

[61] 16 F.3d at 1193, 29 U.S.P.Q.2d at 1849.

[62] *Id.*

[63] 16 F.3d at 1194, 29 U.S.P.Q.2d at 1850.

[64] 16 F.3d at 1194-95, 29 U.S.P.Q.2d at 1850.

[65] 16 F.3d at 1195, 29 U.S.P.Q.2d at 1850.

[66] *Id.*

[67] *Id.*

[68] *Id.*

[69] Lantech, Inc. v. Keip Mach. Co., 32 F.3d 542, 31 U.S.P.Q.2d (BNA) 1666 (Fed.Cir. 1994).

[70] 32 F.3d at 547, 31 U.S.P.Q.2d at 1671.

[71] *Id.*

[72] *Id.*

[73] 32 F.3d at 547, 31 U.S.P.Q.2d at 1670.

[74] 32 F.3d at 547, 31 U.S.P.Q.2d at 1671.

[75] 32 F.3d at 545, 31 U.S.P.Q.2d at 1668.

[76] In re Paulsen, 30 F.3d 1475, 31 U.S.P.Q.2d (BNA) 1671 (Fed. Cir. 1994).

[77] 30 F.3d at 1478 n.2, 31 U.S.P.Q.2d at 1672 n.2.

[78] 30 F.3d at 1479, 31 U.S.P.Q.2d at 1673.

[79] 30 F.3d at 1480, 31 U.S.P.Q.2d at 1675.

[80] 30 F.3d at 1479, 31 U.S.P.Q.2d at 1674.

[81] *Id.*

[82] 30 F.3d at 1479-80, 31 U.S.P.Q.2d at 1674.

[83] 30 F.3d at 1480, 31 U.S.P.Q.2d at 1674.

[84] *Id.*

[85] *Id.*

[86] *Id.*

[87] *Id.* (quoting National Advanced Sys., Inc. v. United States, 26 F.3d 1107, 1111-12 (Fed. Cir. 1994)).

[88] 30 F.3d at 1480, 31 U.S.P.Q.2d at 1674.

[89] *Id.*

[90] 30 F.3d at 1480, 31 U.S.P.Q.2d at 1675.

[91] 30 F.3d at 1480-81, 31 U.S.P.Q.2d at 1675.

[92] 30 F.3d at 1481, 31 U.S.P.Q.2d at 1675.

[93] 30 F.3d at 1481-82, 31 U.S.P.Q.2d at 1676.

[94] 30 F.3d at 1482, 31 U.S.P.Q.2d at 1676.

[95] *Id.*

[96] *Id.*

[97] 30 F.3d at 1482, 31 U.S.P.Q.2d at 1675.

[98] Amsted Indus., Inc. v. Buckeye Steel Castings Co., 24 F.3d 178, 30 U.S.P.Q.2d (BNA) 1462 (Fed. Cir. 1994).

[99] 24 F. 3d at 187, 30 U.S.P.Q.2d at 1469.

[100] *Id.*

[101] 152 U.S. 244, 14 S. Ct. 577 (1894).

[102] *Amsted,* 24 F. 3d at 187, 30 U.S.P.Q.2d at 1469.

[103] *Id.*

[104] *Id.*

[105] 24 F. 3d at 186, 30 U.S.P.Q.2d at 1468.

[106] *Id.*

[107] Amsted Indus. Inc. v. Buckeye Steel Castings Co., 23 F.3d 374, 30 U.S.P.Q.2d (BNA) 1470 (Fed. Cir. 1994); *Amsted Indus.* [II],

supra note 98.

[108] 23 F.3d at 379, 30 U.S.P.Q.2d at 1474 (quoting NASCO, Inc. v. Calcasieu Television & Radio, Inc., 124 F.R.D. 120, 139 (W.D.La. 1989)).

[109] 23 F.3d at 377, 30 U.S.P.Q.2d at 1472-73. The reference is to West Virginia University Hospitals, Inc. v. Casey, 499 U.S. 83, 111 S. Ct. 1138 (1991) (superseded by statute as it pertains to 19 U.S.C. § 1988).

[110] In re Freeman, 573 F.2d 1237, 197 U.S.P.Q. (BNA) 464 (C.C.P.A. 1978); In re Walter, 618 F.2d 758, 767, 205 U.S.P.Q. 397, 407 (C.C.P.A. 1980); In re Abele, 684 F.2d 902, 907, 214 U.S.P.Q. 682, 687 (C.C.P.A. 1982).