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IN RE ALAPPAT: A STRICT STATUTORY INTERPRETATION DETERMINING PATENTABLE SUBJECT MATTER RELATING TO COMPUTER SOFTWARE?

by Sang Hui Michael Kim†

The long awaited decision of In re Alappat1 by the U.S. Court of Appeals for the Federal Circuit ("Federal Circuit") has resolved the issue of whether the U.S. Patent and Trademark Office ("PTO") can ignore 35 U.S.C. section 112, paragraph 6 in determining patentable subject matter pursuant to 35 U.S.C. section 101.2 Alappat involved patentability determinations of a means-plus-function claim (A) giving means-plus-function terms their broadest reasonable interpretation without regards to the specification, and (B) reading limitations from the specification as sanctioned by 35 U.S.C. section 112, paragraph 6.3

The Federal Circuit, relying on In re Donaldson,4 overturned the

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2. 35 U.S.C. section 101 reads as follows:
Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter or any new and useful improvement thereof, may obtain a patent therefore, subject to the conditions and requirements of this title.
35 U.S.C. § 112, paragraph 6, requires that:
An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.
4. In re Donaldson, 16 F.3d 1189, 29 U.S.P.Q.2d 1845 (Fed. Cir. 1994) (holding "the PTO is not exempt from following the statutory mandate of section 112, paragraph 6").
PTO's long standing practice of giving means-plus-function limitations their broadest reasonable interpretation without regards to the specification. The Federal Circuit, following a strict interpretation of section 112, paragraph 6, concluded that:

(1) if a claim comprising "means for" elements, with regards to the specification, is directed to a "combination of interrelated elements" then such a claim constitutes a specific apparatus; and

(2) if a claim constitutes a specific apparatus that produces a result that is used by a physical structure then such a claim constitutes statutory subject matter; and

(3) if a claim to a "general purpose computer" comprising "means for" elements is programmed (under software control) in such a way to perform particular functions then such a claim creates a new machine or a "special purpose computer."

Such a strict statutory interpretation could give computer software patents exclusive rights for non-statutory subject matter (i.e. mathematical algorithms) by claiming the basic components of a general purpose computer and the specific operations it must perform without any positive relationship recited, and imputing limitations into a claim regarding "interrelatedness" and "relationships" from the specification dictated by software regardless if has been claimed or not.

This article reviews the Federal Circuit's decision. Part I describes Alappat's invention and details the case background of the examiner's rejection, the appealed decision to a three member panel of the Board of Patent Appeals and Interferences ("Original Board"), and the reconsideration decision of the Original Board by an expanded panel of the Board ("Reconsideration Board"). Part II analyzes the Federal Circuit's strict


6. Alappat, 31 U.S.P.Q.2d at 1557. The Federal Circuit concluded that Alappat's claim as a "whole" is 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." Id. Such reasoning for interrelatedness was made in view of imputed limitations even when such limitations were not directly recited in the body of the claim. Id.

7. Alappat, 31 U.S.P.Q.2d at 1557 n.23. The body of the appealed claim 15 makes no reference to a display means which is the actual structure that produces the waveform. Id. The claimed rasterizer only calculates numbers which are to be used by a display that produces the waveform. Id. There is no clear connection between the body of the claim with the display means in the preamble. Id.


9. An expanded panel was requested for a reconsideration of the Original Board's decision. The expanded panel consisted of Commissioner Manbeck, Deputy Commissioner
statutory interpretation of 35 U.S.C. section 112, paragraph 6 in patentability determinations pursuant to 35 U.S.C section 101, and discusses the legal basis for determining the extent of the specification that may be read into a "means for" claim. Part III discusses how the rationale used in Alappat may lead to patent grants for computer software related inventions protecting non-statutory subject matter (i.e. mathematical algorithms) under the guise of a means-plus-function claim.

I. ALAPPAT'S INVENTION

Alappat's invention is a rasterizer that produces illumination intensity data "used" by a display means to illuminate pixels on a screen according to a calculated illumination intensity value.10

A. DESCRIPTION

The pertinent sections of the Federal Circuit's description of Alappat's invention are:

Alappat's invention relates generally to a means for creating a smooth waveform display in a digital oscilloscope. The screen of an oscilloscope is the front of a cathode-ray tube (CRT), which is like a TV picture tube, whose screen, when in operation, presents an array (or raster) of pixels arranged at intersections of vertical columns and horizontal rows, a pixel being a spot on the screen which may be illuminated by directing an electron beam to that spot, as in TV. Each column in the array represents a different time period, and each row represents a different magnitude. 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. The waveform data sequence is the processed to provide a bit map, which is a stored data array indicating which pixels are to be illuminated. The waveform ultimately displayed is formed by a group of vectors, wherein each vector has a straight line trajectory between two points on the screen at elevations representing the magnitudes of two successive input signal samples and at horizontal positions representing the timing of the two samples.

Because a CRT screen contains a finite number of pixels, rapidly rising and falling portions of a waveform can appear discontinuous or jagged due to differences in the elevation of horizontally contiguous pixels included in the waveform. In addition, the presence of "noise" in an input signal can cause portions of the waveform to oscillate between contiguous pixel rows when the magnitude of the input signal lies between values represented by the elevations of the two rows. Moreover, the vertical resolution of the display may be limited by the number of

Comer, Assistant Commissioner Samuels, Chairman Serota, Vice-Chairman Calvert, Examiner Linguist, Examiner Thomas, and Examiner-in-Chief Krass.

rows of pixels on the screen. The noticeability and appearance of these effects is known as aliasing.

To overcome these effects, Alappat's invention employs an anti-aliasing system wherein each vector making up the waveform is represented by modulating the illumination intensity of pixels having center points bounding the trajectory of the vector. The intensity at which each of the pixels is illuminated depends upon the distance of the center point of each pixel from the trajectory of the vector. Pixels lying squarely on the waveform trace receive maximum illumination, whereas pixels lying along an edge of the trace receive illumination decreasing in intensity proportional to the increase in the distance of the center point of the pixel from the vector trajectory. Employing this anti-aliasing technique eliminates any apparent discontinuity, jaggedness, or oscillation in the waveform, thus giving the visual appearance of a smooth continuous waveform. In short, and in lay terms, the invention is an improvement in an oscilloscope comparable to a TV having a clearer picture.\footnote{Alappat, 31 U.S.P.Q.2d at 1551-52 (emphasis added).}

Alappat discovered that to minimize or eliminate the appearance of a discontinuous waveform caused by aliasing on an output screen (CRT display) that a rasterizer should calculate the intensity of illumination of each pixels along the trace vector according to a predetermined mathematical algorithm.\footnote{Alappat, 31 U.S.P.Q.2d at 1552.} The illustration used by the Federal Circuit describing the manner in which Alappat's invention generates a smooth waveform is recreated as formula 1 along with the predetermined mathematical algorithm:

\begin{equation}
I'(ij) = [1 - (A\Delta Y^j / \Delta Y')] F
\end{equation}

where $\Delta Y^j$ is the j distance between a pixel that falls on the same i-th column of a pixel that is a point on a vector and $\Delta Y'$ is the total j distance between two points of a vector.\footnote{Alappat, 31 U.S.P.Q.2d at 1552 (referring to Figure 5A).} $F$ is a predefined constant equal to the maximum illumination level (15) which is given for vector points that lay on the waveform.\footnote{Id.} For example, given point $i=0$ and $j=1$; $\Delta Y^0 = 1$ and $\Delta Y' = 7$, the resulting value for determining the illumination intensity level is:

\[ I(0,1) = (1 - 1/7) \times 15 = 13 \text { or } D \text { in Hexadecimal} \]
A table listing of pixel illumination values for Formula 1 is provided.\textsuperscript{16}

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|c|}
\hline
i  & j  & I  & i+1 & j  & I  \\
\hline
0  & 7  & 0  & 1   & 7  & 15(F)  \\
0  & 6  & 2  & 1   & 6  & 13(D)  \\
0  & 5  & 5  & 1   & 5  & 10(A)  \\
0  & 4  & 7  & 1   & 4  & 8  \\
0  & 3  & 9  & 1   & 3  & 6  \\
0  & 2  & 11(B) & 1 & 2 & 4  \\
0  & 1  & 13(D) & 1 & 1 & 2  \\
0  & 0  & 15(F) & 1 & 0 & 0  \\
\hline
\end{tabular}
\caption{VECTOR LIST VALUES}
\end{table}

The main points in Alappat’s invention that affect patentability are:

1. whether Alappat’s claimed invention is really directed towards a specific apparatus or a series of process steps; and

2. is the result (a number) produced by the claimed rasterizer “used” or “applied” by any structure in the body of the claim.

B. Appealed Claim

Alappat’s appealed claim 15 reads as follows.

15. A rasterizer for converting vector list data representing sample magnitudes of an input waveform into anti-aliased pixel illumination intensity data to be displayed on a display means comprising:

(a) means for determining the vertical distance between the endpoints of each of the vectors in the data list;

\textsuperscript{16} \textit{Id. See Alappat}, 31 U.S.P.Q.2d at 1569-70 (Archer, C.J., Dissenting) (illustrating the rasterizer in Figure 5A).
(b) means for determining the elevation of a row of pixels that is spanned by the vector;
(c) means for normalizing the vertical distance and elevation; and
(d) means for outputting illumination intensity data as a predetermined function of the normalized vertical distance and elevation.\(^{17}\)

Claims 16 - 19, also, on appeal stand and fall together with claim 15, from which they all depend. Claim 16 limited means (a) to an arithmetic logic unit ("ALU"); Claim 17 limited means (b) to a second ALU; Claim 18 limited means (c) to a barrel shifter; and claim 19 limited means (d) to a read only memory ("ROM").\(^{18}\)

C. CASE BACKGROUND

The examiner rejected the “means for” clauses in claim 15 as being indistinguishable from a “method,” and that the method steps were directed towards non-statutory subject matter under the mathematical algorithm exception to 35 U.S.C. section 101.\(^{19}\) The case was appealed where the Original Board reversed the examiner’s rejection.\(^{20}\) The Original Board, following the section 112, paragraph 6 mandate, found the claim recited specific structures and as a whole was directed to a “machine” which is patentable subject matter under 35 U.S.C. section 101.\(^{21}\) The examiner, pursuant to MPEP section 1214.04,\(^{22}\) filed for a reconsideration of the Original Board’s decision which was granted by the Assistant Commissioner Manbeck. The appealed case then went before an expanded panel of the Board (Reconsideration Board), which reversed the decision of the Original Board and reinstated the Examiner’s rejection.\(^{23}\) Alappat appealed to the Federal Circuit, which reversed the Reconsideration Board’s decision stating that “the PTO erred as a matter of law in not following the 112 paragraph 6 mandate.”\(^{24}\) With regards to section 112, paragraph 6, the Federal Circuit affirmed the Original Board’s decision viewing the appealed claim as a specific apparatus that uses a mathematical algorithm for a useful result (i.e., displaying a smooth waveform on a digital oscilloscope).\(^{25}\)

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18. *Id.*
20. *Id.*
21. *Id.*
22. MANUAL OF PATENT EXAMINING PROCEDURE, § 1214.04 (Rev. 16, 1994), Examiner Reversed, states:

The examiner may request reconsideration of the Board decision. Such a request should normally be made within one month of the receipt of the Board decision in the group.
25. *Id.*
IN RE ALAPPAT

(1) Examiner's Rejection

The examiner did not read limitations from the specification concerning the “means for” clauses, but interpreted the “means for” clauses to read on each and every means for performing the recited function. Thus, examiner found the appealed claim not directed towards a specific apparatus, but to a series of method steps.

a. Broadest Reasonable Interpretation

Prior to Donaldson, an Examiner followed the PTO's policy26 of giving “means for” language the broadest reasonable interpretation without reading limitations from the specification, and finding the claim indistinguishable from a method.27 The Court of Customs and Patent Appeals (“C.C.P.A.”) supported this position in In re Walter28 stating that:

If the functionally-defined disclosed means and their equivalents are so broad that they encompass each and every means for performing the recited functions, the apparatus claim is an attempt to exalt form over substance since the claim is really to the method or series of functions itself. . . . In such cases the burden must be placed on the applicant to demonstrate that the claims are truly drawn to specific apparatus distinct from other apparatus capable of performing the identical functions.

If this burden has not been discharged, the apparatus claim will be treated as if it were drawn to the method or process which encompasses all of the claimed means. . . . The statutory nature of the claim under section 101 will then depend on whether the corresponding method is statutory29

Following P.T.O. policy, Alappat's claim would appear nothing more than steps to be performed by any general purpose computer. The claimed limitations would encompass each and every means for a general purpose computer to perform the recited functions. The C.C.P.A. in


27. Ex parte Alappat, 23 U.S.P.Q.2d at 1345.

28. In re Walter, 618 F.2d 758, 205 U.S.P.Q. 397 (C.C.P.A. 1980). Walter appealed from the P.T.O. Board of Appeals affirming the final rejection of claims regarding a seismic prospecting system. Id. The C.C.P.A. held that Walter claimed a mathematical algorithm, notwithstanding that his claims limited the use of his method to a particular technology. Id.

In re Freemen\textsuperscript{30} stated that “it would be anomalous to grant a claim to an apparatus encompassing any and every ‘means’ practicing the method.”\textsuperscript{31} Thus, the examiner would have found this to be the effect of Alappat’s claim without regards to the specification.

b. A Lack of Positive Relationship

The examiner noted that Alappat’s apparatus claim comprising “means for” language was indistinguishable from that of a method because the “means for” clauses lacked any “distinction” to a specific apparatus.\textsuperscript{32} The examiner explained that the claimed means in part [a] was not associated with the means in part [b], the means in part [c] was not associated with the means in parts [a] and [b], and the means in part [d] was not associated with the means in part [c]. Thus, as a “whole” the claim was not actually directed to a specific type of apparatus.\textsuperscript{33}

Notably though, a positive relationship between “means for” elements could be construed as specific interconnections or interrelatedness, which could relate more to a specific apparatus rather than to a method. However, a close analysis of Alappat’s “means for” claim reveals the absence of any such relationship.\textsuperscript{34}

30. *In re* Freemen, 573 F.2d 1237, 197 U.S.P.Q. 464 (C.C.P.A. 1978). The C.C.P.A. held that claims for a computer controlled typesetting system that did not recite or preempt a mathematical algorithm recited patentable subject matter because any new any useful process fits within statutory subject matter. *Id.*


33. *Id.*

34. This situation is distinct from the claims found in *In re Iwahashi*, 888 F.2d 1370, 1375, 12 U.S.P.Q.2d 1908, 1911 (Fed. Cir. 1989) (applying the Freeman-Walter test to claims directed to auto-correlation circuit, and holding claims patentable under 35 U.S.C. section 101). In Iwahashi, an auto-correlation circuit claimed in “means for” language did contain “positive relationship” with other “means for” elements, and was construed as a specific apparatus. *Id.*

Iwahashi involved the section 112, paragraph 6 mandate in patentability determinations. The Federal Circuit found that each “means for” element had a “positive relationship” with other “means for” elements. Viewed as a whole, the court found the claim directed to a specific type of apparatus that used a mathematical algorithm for providing auto-correlation coefficients. Close analysis of Iwahashi’s claim demonstrates the meaning of such a relationship.

Iwahashi’s claim reads as follows.

\[\text{[a]}\] An auto-correlation unit for providing auto-correlation coefficients for use as a feature parameters in pattern recognition for N pieces of sampled input values Xn (n=0 to N - 1), said unit comprising:

\[\text{[b]}\] means for extracting N pieces of sample input values Xn from a series of sample values in an input pattern expressed with an accuracy of optional multi-bits;

\[\text{[c]}\] means for calculating the sum of the sample values Xn and Xn-1 (t=0-P, P<N);

\[\text{[d]}\] a read only memory associated with said means for calculating;

\[\text{[e]}\] means for feeding to said read only memory the sum of the sample input values as an address signal;
The examiner did not read such circuit interconnections into the claims corresponding to parts [a] - [d] contained in the specification. On that point, the Reconsideration Board supported the examiner's assertion stating:

In our view it would be improper claim interpretation to read the structures and connection interrelationships disclosed in the specification into claim 15. By contrast, the claim in Iwahashi expressly recited how each of the means was interconnected with the other means and with the ROM. We agree with the examiner that 'the claim language . . . does not positively recite structural limitations' and, thus, we conclude that the examiner properly treated claim 15 as if it were a method claim.  

c. Test for Patentability of Method Claims

As defined in Gottschalk v. Benson, a mathematical algorithm is "a

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\[ \sum_{n=0}^{N-1} \frac{(X_n + X_{n+1})^2}{2^{n-1}X_n^2} - 1 \]

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Elements [b] through [h] correspond to specific structures in the drawings which are: [b] analog to digital converter 11 in Fig.2; [c] adder 1; [d] ROM 2; [e] Signal path connecting adder 1 to ROM 2; [f] Internal structure of ROM 2 after being programmed to store square values; [g] Read pulse (not shown) which is applied to ROM 2 in Fig.2 signal f1 or f2 applied to ROM15; and [h] calculating circuit 5, respectively.

In Iwahashi's claim, the Federal Circuit found a direct relationship with each of the "means for" elements, and, with regards to the specification, each "means for" element corresponded to a well known circuit element that had direct relationships with other circuit elements. Specifically, part [b] (A/D converter) was associated with part [c] (adder); part [d] (ROM) was associated with part [e] (signal path), [f] (ROM), and [g] (read pulse); and part [h] (calculating circuit) was responsive to part [d]. The Federal Circuit held the claim for an auto-correlation circuit was directed to a specific apparatus that had a specific circuit implementation because of the claimed positive relationship, and it would be improper to treat it as a method claim. Id.


36. Id. at 1344-1345.

37. Gottschalk v. Benson, 409 U.S. 63, 65, 175 U.P.S.Q. 673, 675 (1972). In Benson, the applicants broadly claimed a method for converting binary-coded decimal ("BCD") numerals into pure binary numerals. Id. at 64. The relevant claims were rejected by the PTO but sustained by the C.C.P.A. Id. In reversing the C.C.P.A., Justice Douglas explained:
procedure for solving a given type of mathematical problem." Alappat's claim would, thus, be viewed as nothing more than a method for performing the following steps:

(a) calculate a difference;
(b) calculate another difference;
(c) shift the values of the differences; and
(d) output data corresponding to a predefined mathematical function of the differences.

The determining factor in the above method is whether "outputting" data (numerical information representing illumination intensity) would constitute statutory subject matter. The two-part test used to make this determination, as outlined by the Assistant Commissioner of Patents, Stephen G. Kunin, is stated as follows.

The CAFC, formerly in part the Court of Customs and Patent and Patent Appeals (C.C.P.A.), has developed a two-part test for determining whether a claim which recites a mathematical algorithm complies with 35 U.S.C. section 101. This test was enunciated in In re Freemen. The first step of the test is to ascertain whether a mathematical algorithm is claimed directly or indirectly. The second step of the test, which is applied only if a mathematical algorithm is found in the first step, is to analyze the claimed invention taken as a whole to determine whether the algorithm is preempted. This second test has been clarified by the C.C.P.A. in In re Walter as follows:

If it appears that the mathematical algorithm is implemented in a specific manner to define structural relationship between the physical elements of the claim or to refine or limit claim steps, the claim being otherwise statutory, the claim passes muster under Section 101. If, however, the mathematical algorithm is merely presented and solved by the claimed invention, as was the case in Benson, and is not applied in any manner to physical elements or process steps, no amount of post solution activity will render the claim statutory; nor is it saved by a preamble merely reciting the field of use of the mathematical algorithm.

It is conceded that one may not patent an idea. But in practical effect that would be the result if the formula for converting BCD numerals were patented in this case. The mathematical formula involved here has no substantial practical application except in connection with a digital computer, which means that if the judgement below is affirmed, the patent would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself.

Id. at 71-2.
38. Id. at 674.
Alappat's claim would show that (1) the claim did recite a mathematical algorithm in the Benson sense (indirectly), and (2) that the method steps were nothing more than solving a mathematical algorithm and the outputting of a result was not used by any specific structure or element recited in the claim. Such a method claim would be considered non-statutory subject matter under the mathematical algorithm exception because only a mathematical algorithm is solved without any "useful" application of the solved algorithm by some type of structure.

\[\text{d. Patentability With Corresponding Structures}\]

Even if Alappat's claim 15 was interpreted as a true apparatus instead of a method, with each "means for" corresponding to its respective structure as described in the specification relating to dependent claims 16-19 of an (ALU, Barrel Shifter, and ROM), the examiner would still have considered claim 15 to be non-statutory in nature.

Nevertheless, we note that the Examiner stated during prosecution: the use of the physical elements to provide the number crunching is not considered patentable. The mere display of illumination intensity data is not considered significant post solution activity. Thus, even if the specific structures recited in dependent claims 16-19 had been incorporated into claim 15, the Examiner presumably would have found claim 15 to be directed to non-statutory subject matter.

The description of Alappat's invention describes that illumination intensity data are numbers ranging from 0-15 and outputting such numbers would not constitute significant post-solution activity because no structure applies or uses the calculated results. In his specification, Alappat does describe an output display of a digital oscilloscope that uses the calculated result to illuminate pixels according to the calculated values, but such limitations are not recited in the body of the appealed claim 15.

\[\text{(2) The Three-Member Panel of the Board's Decision (Original Board)}\]

The Original Board, following section 112, paragraph 6, interpreted the "means for" elements with regards to the specification. The key fac-

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40. *Alappat*, 31 U.S.P.Q. at 1555-6. Alappat's claim reading as a method would have the end result of outputting the result of a mathematical algorithm. As stated in *In re Walter*, 205 U.S.P.Q. 397, 407 (C.C.P.A. 1982), "no amount of post solution activity" will render the claim statutory. Notice that in Alappat's claim the result is not used by any element recited in the body of the claim. Thus, outputting a value would be considered non-essential "post solution activity."


43. *Id.* at 1552.

44. *Id.*
tor in the Original Board decision is that physical structure corresponded to each of the "means for" elements, and, thus, such a claim should not be treated as a "method."\footnote{Alappat, 31 U.S.P.Q.2d at 1553-44.}

a. \textit{Section 112, Paragraph 6 Mandate - Corresponding Structure, Material, or Equivalents Thereof}

The Original Board, in reading limitations from the specification as dictated by section 112, paragraph 6, found each "means for" element corresponded with physical structure.\footnote{Id. at 1553.} The Original Board then viewed the claim to be directed to a specific type of "machine" comprising well known circuit elements (ALU, ALU, Shifter, and ROM). The Original Board, thus, interpreted claim 15 as:

\begin{verbatim}
15. A rasterizer . . . comprising:
   A FIRST ALU;
   A SECOND ALU;
   SHIFTERS; and
   ROM.\footnote{Id.}
\end{verbatim}

b. \textit{Two-part Freemen-Walter Test}

The \textit{Freeman-Walter} test for determining mathematical algorithms is not excluded because of the claim form. The \textit{Freemen-Walter} test applies to both "apparatus" and "method" claims. The Original Board applied \textit{Freemen-Walter} to determine whether the claimed "apparatus":

1. recited a mathematical algorithm (directly or indirectly) and
2. applied the mathematical algorithm by physical elements for a useful result.\footnote{In re Freemen, 197 U.S.P.Q. 464, 471 n.5, 573 F.2d. 1237 (1978).}

The Original Board found the claims to recite a mathematical algorithm under the first part of the \textit{Freemen-Walter} test; however, the Original Board never reached the second test because each "means for" element in the appealed claim corresponded to well known structures such as an ALU, Barrel Shifters, and a ROM.\footnote{Ex parte Alappat, 23 U.S.P.Q.2d 1340, 1340-41 (1992).} The Original Board found the claims were drafted in terms of "means for" limitations as permitted by 35 U.S.C. section 112, paragraph 6, and that each "mean for" limitations corresponded to a physical structure in claim 15, and because claim 15 contains physical structures such a claim was interpreted by the Original Board to be directed to form of apparatus or machine which passes muster under 35 U.S.C. section 101.\footnote{Id. at 1341-42.}
c. Not a Method Claim

The panel concluded "that the disclosed means in the specification and their equivalents are not so broad as to encompass and each and every means for performing the functions in claim 15 and, so, the claims may not be treated as a method claim for the purposes of applying the two-part 101 test." Thus, concluding the second part of the two-part Freemen-Walter test cannot be applied to a true "apparatus" claim.

(3) Expanded Reconsideration Panel of the Board's Decision

The Reconsideration Board interpreted each "means for" element in the appealed claim to read on each and every means possible for performing the recited functions without regards to the specification. In doing so, the Reconsideration Board considered the following for determining patentable subject matter:

1. whether Alappat's claim is truly directed towards a specific apparatus;
2. whether Alappat's claim should be treated as a method; and
3. whether the range of equivalents to the claimed "rasterizer" comprising "means for" elements does not encompass each and every means for performing the recited functions.

a. Form of a Claim is Not Dispositive

The Reconsideration Board, in treating claim 15, recognized that "the form of the claim is not dispositive, especially where the claims are drafted in means-plus-function (means) as sanctioned by section 112 paragraph 6. The question is of form versus substance." Alappat admitted in oral argument that the claim, if drafted as a method, would probably be considered non-statutory, and, thus, he drafted an apparatus claim using "means for" language. The Reconsideration Board recognized attempts to claim non-statutory methods as an apparatus, and realized that such claims should not evade the section 101 inquiry whether the claim has been drafted as a "method" or "apparatus."

51. Ex parte Alappat, 23 U.S.P.Q.2d at 1341.
52. Id.
54. Id. at 1340.
55. Id. at 1342.

Labels are not determinative in § 101 inquiries. Benson applies equally whether an invention is claimed as an apparatus or process, because the form of the claims is often an exercise in drafting. Though a claim expressed in 'means for' (functional) terms [under 35 U.S.C. § 112(6)] is said to be an apparatus claim, the sub-
b. Need Not Apply Section 112, Paragraph 6 in Patentability Determinations

The five member majority of the expanded Reconsideration Board panel "modified" the decision of the Original Board panel and affirmed the Examiner's Section 101 rejection. The Reconsideration Board modified the Original Board decision that the PTO need not apply section 112, paragraph 6 in rendering patentability determinations. The majority stated that, during examination, the PTO gives means-plus-function clauses in claims their broadest interpretation, and does not impute limitations from the specification into the claims. The Reconsideration Board recognized that the Federal Circuit in *Iwahashi* and in *Arrhythmia Research Technology, Inc. v. Corazonix Corp.*, applied section 112, paragraph 6 in patentability determinations. However, the Reconsideration Board noted that in *Iwahashi* a ROM was specifically recited in the claims along with specific relationships with other "means for" limitations, and was really directed towards a specific apparatus. In *Arrhythmia*, the Reconsideration Board noted that claim interpretation for patent infringement does not apply in *ex parte* prosecution:

> [o]ne must be careful in applying the statements regarding claim construction in Arrhythmia; Arrhythmia was an appeal from an infringement action involving a patent, and the rules of claim construction of patent claims are different than the rules for claim interpretation during *ex parte* prosecution.

**c. Specific Apparatus?**

The Reconsideration Board pointed out that an applicant must show
that the claims are truly directed towards a specific apparatus.\textsuperscript{65} The Reconsideration Board did consider the drawings of Alappat's invention (Fig. #3), and recognized that the disclosed structures showed interconnections between ALU's, Barrel Shifters, and a ROM.\textsuperscript{66} However, such relationships were not explicitly detailed in the claims, and the Reconsideration Board agreed with the examiner that a lack of "positive relationship" existed within the "means for" elements as claimed.\textsuperscript{67} The Reconsideration Board stated:

[claim 15 does not claim the specific disclosed apparatus and does not claim the disclosed interrelationship among the means. Claim 15 does not recite that the means in paragraphs (a) and (b) are separate means, or that the means in paragraph (c) is a pair of means, or that the outputs of the separate means of paragraphs (a) and (b) are connected to the pair of means of paragraph (c) which is connected to the means of paragraph (d) . . . . In our view it would be improper claim interpretation to read the structures and connection interrelationships disclosed in the specification into claim 15. By contrast, the claim in Iwahashi expressly recited how each of the means was interconnected with the other means and with the ROM. We agree with the examiner that the claim language . . . does not positively recite structural limitations (Examiner's Answer at 6) and, thus, we conclude that the examiner properly treated claim 15 as if it were a method claim.\textsuperscript{68}

Such imputed limitations from the specification (i.e. circuit interconnection in Fig. #3) were not considered because they were not directly recited in the claims, and the Reconsideration Board found such claim interpretation to be improper.\textsuperscript{69} In addition, the Reconsideration Board noted that interrelated means for elements may constitute statutory subject matter:

we agree that a combination of interrelated means may, in appropriate circumstances, define statutory subject matter. New computer structures are statutory subject matter even though they may perform non-statutory processes. However, in this case, as we have noted, there is no claimed interrelationship among the means in claim 15 or limitation of the means to that disclosed in the specification. If the means for words are removed from claim 15, the only thing remaining is a series of method steps.\textsuperscript{70}

\textsuperscript{66} Id.
\textsuperscript{67} Id.
\textsuperscript{68} Id. (emphasis added).
\textsuperscript{69} Ex parte Alappat, 23 U.S.P.Q.2d. at 1345.
\textsuperscript{70} Id. (emphasis added).
d. **Imputing Limitations Not Recited**

Furthermore, the Reconsideration Board recognized structural relationships in Alappat's specification but found that it would be improper to impute such limitations into a claim if such limitations were not directly recited by the claim:

We cannot agree that claim 15 is directed to specific apparatus because the means to perform the function are disclosed to be conventional structure in the art. To so hold would require us to improperly read limitations into claim 15.71

The Reconsideration Board only interpreted the claim as written, and did not impute any limitations from the specification that were not directly recited in the claims. However, the Reconsideration Board did recognize that the specification disclosed a specific apparatus which stated:

The disclosure of apparatus for performing the means does not imply that the claim is directed only to that apparatus. It is improper to presume that 'conventional structure in the art' and its equivalents limit the claimed means for performing the functions to less than any and every means. . .72

The Reconsideration Board also noted the dependent claims reciting specific structure which stated:

In our view, it is also improper to read limitations of the dependent claim into claim 15. While dependent claims 16-19 recite specific structure corresponding to the structure disclosed in the specification, it is legal error to read such limitation into the 'means' terms in claim 15.73

Thus, by just interpreting the body of the Alappat's claim as written, the Reconsideration Board could not distinguish a claim to a specific apparatus.

e. **Treating an Apparatus Claim as a Method Claim**

The Reconsideration Board, thus, interpreted the means for clauses to read on each and every means for performing the particular functions recited. The C.C.P.A. in *In re Walter* described the manner in which a "means for" claim should be treated as a "method":

If the functionally-defined disclosed means and their equivalents are so broad that they encompass any and every means for performing the re-

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71. *Id.* at 1345. The Reconsideration Board cited *In re Priest*, 582 F.2d 33, 37, 199 U.S.P.Q. 11, 15 (C.C.P.A. 1978), where the C.C.P.A. held that it was "improper to impute inferential limitations into the claims." The Reconsideration Board was referring to the claimed apparatus in Figure 3, and that it would be improper to impute that figure and its interconnections to claim 15.

72. *Ex parte Alappat*, 23 U.S.P.Q.2d at 1345

73. *Id.* (citing *Palumbo v. Don-Joy Co.*., 762 F.2d 969, 977, 226 U.S.P.Q. 5, 10 (Fed. Cir. 1985), for the proposition that it is legal error to read into a dependent claim, a limitation set forth in another claim).
cited functions, the apparatus claim is an attempt to exalt form over substance since the claim is really to the method or series of functions itself. . . . In such cases the burden must be placed on the applicant to demonstrate that the claims are truly drawn to specific apparatus distinct from other apparatus capable of performing the identical functions.

If this burden has not been discharged, the apparatus claim will be treated as if it were drawn to the method or process which encompasses all of the claimed "means." The statutory nature of the claim under section 101 will then depend on whether the corresponding method is statutory.74

The Reconsideration Board concluded that "appellants have not carried their burden of showing that claim 15 is directed to specific apparatus and, therefore, that it is proper to treat claim 15 as a method claim."75

The Reconsideration Board noted that

[In accordance with Maucorps, etc., we interpret the 'means' literally as encompassing any and every means for performing the function and treat claim 15 as indistinguishable from a method claim. Under Walter, the burden 'is placed on the applicant to demonstrate that the claims are truly drawn to specific apparatus distinct from other apparatus capable of performing the identical functions.]76

f. Range of Equivalents

The Reconsideration Board pointed out that the equivalents to each of the "means for" elements as recited in the specification could still encompass each and every means for performing the recited functions remarking:

It is improper to presume that 'convention structure in the art' and its equivalents limit the claimed means for performing the functions to less than any and every means. Even if the range of equivalents could be determined at the time of examination or applicant were willing to admit to a range of equivalents under section 112 paragraph 6, section 112 paragraph 2 requires that the claim particularly point out and define the apparatus, i.e., what is and is not within the scope of the claim.77

Particularly, what are the equivalents to an ALU, Barrel Shifter, and a ROM? An ALU is defined as "the element able to perform basic data manipulations in the central processor; usually the unit can add, subtract, complement, negate, rotate, AND and OR."78 Under this definition, any element that can perform any arithmetic operation may be

74. Walter, 205 U.S.P.Q. at 498 (citations omitted).
75. Ex parte Alappat, 23 U.S.P.Q.2d at 1344.
76. Id.
77. Id. at 1345.
78. JERRY M. ROSENBERG, DICTIONARY OF COMPUTERS, INFORMATION PROCESSING & TELECOMMUNICATIONS, 26 (John Wiley & Sons, Inc. 1984).
construed as an ALU. Thus, applying section 112 paragraph 6 equivalency to an ALU would entail that an ALU could possibly be the *only* means used for performing the recited functions. Likewise for a Barrel Shifter and a ROM, any element that shifts data or a storage means could be considered an equivalent respectively. Such equivalency would still encompass each and every means for performing the recited functions as dictated by 112 paragraph 6.

Thus, the Reconsideration Board concluded that the only difference between the structures claimed in *Alappat* and any other equivalent is how it is used (i.e. how each element is programmed). From this reasoning, the Majority in *Alappat* concluded that “[u]nder the Board majority’s reasoning (Reconsideration Board), a programmed general purpose computer could never be viewed as patentable subject matter under section 101. This reasoning is without basis in law.”

The key points that the Reconsideration Board addressed were that:

1. Alappat’s claim was not directed to a specific apparatus, but to a general purpose computer that comprised of an ALU, Barrel Shifters, and a ROM performing the recited functions;
2. Since no distinction in the claims resulted in a specific apparatus the end result was that Alappat was claiming a series of process steps; and
3. Alappat’s claimed invention is really directed to a method for a general purpose computer, and it is those method steps which should be analyzed to determine statutory subject matter.

**g. Patentability Determination**

Therefore, the Reconsideration Board viewed claim 15 as a programmed general purpose computer performing a series of method steps. Reconsideration Board applied the two-part *Freemen-Walter* test in determining whether the claim as a whole is directed to a mathematical algorithm. The Reconsideration Board pointed out that (1) the algorithm is not “applied in any manner to physical elements or process steps” (2) and “outputting” is not necessarily a function used by a display means.

As stated in *Walter*, “if the mathematical algorithm is applied by any

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82. *See id.*
83. *See id.*
85. *Id.*
physical element or structure" 86 then the claim would be statutory because it would not be the algorithm that the claim is directed to, but an application of the algorithm. 87 In Alappat's specification, a rasterizer generates illumination intensity level data for pixels to be displayed on a CRT display. If a CRT display (or any output display) was claimed that used the calculated illumination intensity level data then such a claim would clearly be statutory. As was the case in In re Chatfield, 88 the C.C.P.A. found that the method steps of operating a computing system were not directed to the mathematical algorithm per se but when viewed as a whole was an improvement for a computing system that recited physical structures applying a mathematical operation. 89 The C.C.P.A. in In re Johnson 90 found that "the products produced by applicants' claimed processes are new, noiseless seismic traces recorded on a record medium and not mere mathematical values. Thus, the significant limitations recited in the claims of operating on a recorded, unenhanced, seismic trace to produce and record a new seismic trace lead us to find the claims to recite statutory subject matter." 91

Alappat's claim when viewed as a method calculates a result (illumination intensity level data) and outputs the result, yet no structure or element uses or applies that result as claimed. In addition, the result is not used to "reduce an article of manufacture to a new state or thing" which was also held to be a key factor in determining patentable subject matter for process claims. 92 If the body of Alappat's claim recited a display means to receive the result and uses the result to display a waveform then such a display would constitute a "change of something

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87. Id.
89. In Chatfield, the C.C.P.A. reversed the Patent and Trademark Office Board of Appeal's rejection of Chatfield's claims directed to a "method of operating a multiprogrammed computing system." Chatfield, 545 F.2d at 153. Chatfield had developed a method for prioritizing the availability of "peripheral resource equipment" to one or more concurrently running programs. Id. at 153-54. Although Chatfield's dependent claims "set forth a number of different algorithms which may be used in carrying out intermediate steps in overall process of operating a computer system," the C.C.P.A. held that algorithms did not "constitute a method per se." Id. at 157-58. The C.C.P.A. determined that "[a] patent issuing on Chatfield's claimed method would . . . preempt neither the mathematical formulae nor the algorithms specified in such a patent, unless used in performance of the entire claimed method," and allowed the patent to issue. See id. at 158-59.
90. In re Johnson, 589 F.2d 1070, 200 U.S.P.Q. 199 (C.C.P.A. 1978). In Johnson, the invention involved a method for removing unwanted noise from seismic data. Id. at 1070. The C.C.P.A. held the previously rejected claims allowable, characterizing the subject matter as a "statutory [method] for producing new and different, noise-free seismic traces from seismic data traces which contain noise." Id. at 1081.
91. Id. at 208.
physical to a new state or thing.” However, in the body of Alappat’s claim such an application or use of a mathematical algorithm was not specifically recited or detailed, and the Reconsideration Board only interpreted the claim as written.

II. ANALYSIS

The Federal Circuit, in applying a strict statutory interpretation of 35 U.S.C. section 112, paragraph 6 held that:

(1) A claim comprising “means for” elements must be viewed with regards to the specification, and that all “acts described in the specification” may be imputed to each corresponding “means for” element (i.e., circuit interrelatedness or interconnections);\(^93\)

(2) A specific apparatus that produces a result that is to be used by a physical structure constitutes statutory subject matter;\(^94\) and

(3) A “general purpose computer” comprising “means for” elements that is programmed in such a way to perform particular functions creates a new machine or a “special purpose computer.”\(^95\)

The main distinction between the Federal Circuit’s decision and that of the Reconsideration Board lies in the answer to the question “what exactly did the applicant invent?”\(^96\) The Reconsideration Board, using a broad interpretation of the claims without regards to the specification, found a method for performing a mathematical algorithm that did not use the result of a mathematical algorithm by physical structure. The Federal Circuit reviewed the means for elements in light of the specification and found a specific apparatus that produced a “useful” result.

A. SECTION 112, PARAGRAPH 6 INTERPRETATION - APPARATUS OR METHOD


The Federal Circuit in In re Donaldson explained that the “PTO is not exempt from following the statutory mandate of 112, sixth para-

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\(^93\) See Alappat, 31 U.S.P.Q.2d at 1555.
\(^94\) See id. at 1557.
\(^95\) Id. at 1558 (citing In re Freeman, 573 F.2d at 1247 n.11).
\(^96\) See In re Abele, 684 F.2d 902, 907, 214 U.S.P.Q. 662, 687 (C.C.P.A. 1982). In Abele, the invention at issue produced an improved image resulting from computerized axial tomography (“CAT”) scans. Id. at 903. Abele’s claims “implement[ed] a mathematical algorithm.” Id. at 907. However, the C.C.P.A. found that, with respect to certain claims, “production, detection, and display steps would result in a conventional CAT-scan process” even without the algorithm. Id. at 908. The C.C.P.A. allowed those claims, reasoning that Abele had “discover[ed] an application of an algorithm to process steps which are themselves part of an overall process which is statutory.” Id. at 909.
In Alappat, the Federal Circuit stated that the Reconsideration Board “erred as a matter of law in refusing to apply section 112, paragraph 6 in rendering its section 101 patentable subject matter determination.” The court directed that the PTO must consider the limitations in the specification when determining the scope of the means-plus-function elements.

a. Each “Means for” Clause Must be Viewed as to Its Corresponding Structure in the Specification.

The Federal Circuit, thus, construed Alappat’s means clauses encompassing the corresponding structure detailed in the specification. The following is the modified claim 15 with the corresponding specification structure provided inside the brackets.

15. A rasterizer [a “machine”] for converting vector list data representing sample magnitudes of an input waveform into anti-aliased pixel illumination intensity data to be displayed on a display means comprising:

(a) [an arithmetic logic circuit configured to perform an absolute value function, or an equivalent thereof] for determining the vertical distance between the endpoints of each of the vectors in the data list;

(b) [an arithmetic logic circuit configured to perform an absolute value function, or an equivalent thereof] for determining the elevation of a row of pixels that is spanned by the vector;

(c) [a pair of barrel shifters, or equivalents thereof] for normalizing the vertical distance and elevation; and

(d) [a read only memory (ROM) containing illumination intensity data, or equivalent thereof] for outputting illumination intensity data as a predetermined function of the normalized vertical distance and elevation.

The Federal Circuit agreed with the Original Board’s decision that the “means for” clauses did not encompass each and every means for performing the recited functions, but corresponded to “a combination of known electronic circuitry elements,” and could not be treated as a method contrary to the Reconsideration Board’s analysis.

98. Id.
99. Alappat, 31 U.S.P.Q.2d at 1555. The claim is reproduced from the Majority Decision interpreting claim 15 with the corresponding structures contained in the specification.
B. SECTION 101 DETERMINATION

1. Claim as a Whole

The Federal Circuit stated that "the proper inquiry in dealing with the so called mathematical subject matter exception to 101 alleged herein is to see whether the claimed subject matter as a whole is disembodied mathematical concept . . . ."101 The Federal Circuit based this inquiry on the Supreme Court decision of Diamond v. Diehr102 which stated:

... when a claim containing a mathematical formula, [mathematical equation, mathematical algorithm, or the like,] implements or applies that formula [,equation, algorithm, or the like,] in a structure or process which, when considered as in whole, performing a function which the patent laws were designed to protect (e.g., transforming or reducing an article to a different state), then the claim satisfies the requirements of 101.103

In answering the question "what did the applicant invent?", the Federal Circuit directed their inquiry to the specification. The Federal Circuit found physical structure and "acts" based on a mathematical algorithm necessary to transform or reduce a "CRT Display" to a new state "creating a smooth waveform."104 The Federal Circuit, accordingly, strictly interpreted section 112, paragraph 6, and imputed limitations from the specification not recited in the claims.105

2. Imputed Limitations

The Federal Circuit recognized that the “means for” elements in Alappat’s claim “lacked positive relationship” between the other “means for” elements that were pointed out by the Examiner and the Reconsideration Board.106 However, the Federal Circuit stated:

[although many, or arguably even all, of the means elements recited in claim 15 represent circuitry elements that perform mathematical calculations, which is essentially true of all digital electrical circuits, the claimed invention as a whole is 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.]107

101. Id. at 1557.
103. Id. at 1 (emphasis added).
105. Id.
106. Id.
107. Id.
The Federal Circuit suggested in a footnote that such imputed structural limitations from the specification is proper, even if not directly recited in the claims.

The Board majority stated that each of the means of claim 15 represents a mathematical operation. The (Board) majority failed, however, to point out any particular mathematical equations corresponding to elements (c) and (d) of claim 15. In addition, we note the Board majority's irreconcilable position that it is free to impute mathematical equations from Alappat's specification into claim 15, yet it refused to impute the electrical structure designed to carry out the arithmetic operations.\(^{108}\)

Additionally, the Federal Circuit suggested imputing limitations from the preamble into the body of the claim.

Furthermore, the claim preamble's recitation that the subject matter for which Alappat seeks patent protection is a rasterizer for creating a smooth waveform is not a mere field-of-use label having no significance. Indeed, the preamble specifically recites that the claimed rasterizer converts waveform data into output illumination data for a display, the means elements recited in the body of the claim make reference not only to the inputted waveform data recited in the preamble but also to the output illumination data also recited in the preamble. Claim 15, thus, defines a combination for producing an anti-aliased waveform.\(^{109}\)

Based on the imputed limitations, claim 15 should really have the following imputed limitations. [ ] represent imputed specification "means for" structure, and () represent imputed specification limitations.

15. A rasterizer [a "machine"] for converting vector list data representing sample magnitudes of an input waveform into anti-aliased pixel illumination intensity data to be displayed on a display means comprising:

(a) [an arithmetic logic circuit configured to perform an absolute value function, or an equivalent thereof] for determining the vertical distance between the endpoints of each of the vectors in the data list;

(b) [an arithmetic logic circuit configured to perform an absolute value function, or an equivalent thereof] for determining the elevation of a row of pixels that is spanned by the vector;

(c) [a pair of barrel shifters, or equivalents thereof] for normalizing the vertical distance and elevation [wherein said barrel shifters receive the vertical distance value and elevation value from said means in part (a) and (b) respectively];

(d) [a read only memory (ROM) containing illumination intensity data, or equivalent thereof] for outputting illumination intensity data as a predetermined function of the normalized vertical distance and elevation [wherein said ROM receives outputs of said pair of barrel shifters; and]

\(^{108}\) Alappat, 31 U.S.P.Q.2d at 1557 n.22 (emphasis added).

\(^{109}\) Alappat, 31 U.S.P.Q.2d at 1558. Note, the body of Alappat's claim recites no direct connection or relationship to the display means in the preamble.
[(e) display means for receiving illumination intensity data from said ROM and displaying pixels according to said illumination intensity data.]

3. Section 101 Determination - With Imputed Limitations

Such imputed limitations would clearly make Alappat’s claim statutory because (1) A physical display means uses a mathematical algorithm; and (2) the claim as whole does not merely present and solve a mathematical algorithm. Specifically, this claim details that an output display has relationship to a ROM, which outputs its illumination intensity data to the display and the output display illuminates the corresponding pixels to its calculated intensity level.

4. Section 101 Determination - Without the Imputed Limitations

Alappat’s claim that refers to just the corresponding structures without any imputed limitations from the specification not recited in the claim would still be considered non-statutory because it would have been found: (1) only solving a mathematical algorithm without any end use and (2) the post solution activity of outputting a result would not render it patentable under section 101. Alappat’s claim to just its corresponding structures would read as:

A Rasterizer . . . comprising:
A first ALU for . . . ;
A second ALU for . . . ;
Barrel Shifters for . . . ; and
ROM for outputting a number.

The Federal Circuit recognized that a true apparatus claim may fall under the mathematical algorithm exception.110

a. Applying Gottschalk v. Benson

In Gottschalk v. Benson, the Supreme Court held that algorithms used to convert binary code decimal numbers to equivalent pure binary numbers are unpatentable.111 In applying Benson, the courts have consistently employed two rules:

(1) the claim invention must be interpreted as a whole;112 and
(2) if a mathematical algorithm is merely solved by the claimed invention and not applied in any manner to physical elements no amount of post solution activity will render the claim statutory.113

b. Claimed Invention As a Whole

Regarding Benson rule 1, Alappat's claim interpreted as a whole with each "means for" element corresponding to its respective structure reads on basic components of a general purpose computer. The general purpose computer then being programmed to perform the following steps: (a) calculate differences, (b) shift the binary digits of the differences, (c) plug the shifted differences into a predetermined function, and (d) generate as output its results.

c. Application by Physical Elements

Regarding the second Benson rule, such a claim would be considered non-statutory because the outputted result is not applied to anything physical. If such a claim recited a display means with relationship to the ROM that received the output of the ROM and displayed pixels according to the calculated results, then such a claim would pass the second rule. Consequently, the Federal Circuit, in the Alappat decision, imputed such physical limitations and interrelatedness to overcome non-statutory subject matter. The basis for such imputed limitations relies on a strict statutory interpretation of section 112, paragraph 6 wherein a means for element corresponds to its “structure, materials, elements or equivalents thereof, and acts described in the specification.” Where arguably, “acts” means relationships.

The Alappat court implies there is no distinction between a claim to an apparatus that produces a result that is to be used by a physical structure, and actually applying or using the result. The Federal Circuit, specifically, stated:

A close analysis of Diehr, Flook, and Benson reveals the Supreme Court never intended to create an overly broad, fourth category subject matter excluded form section 101. Rather, at the core of the Court's analysis in each of these cases lies an attempt by the Court to explain a rather straightforward concept, namely, that certain types of mathematical subject matter, standing alone, represent nothing more than abstract ideas until reduced to some type of practical application, and thus that subject matter is not, in and of itself, entitled to patent protection.114

Here the Federal Circuit implies that detailing how the result is to be used would satisfy the concept of “reduced to some type of practical application.”

C. Legal Basis for Imputing Limitations From the Specification

The Federal Circuit in reviewing Alappat's invention found the description of the invention to be statutory. However, if a claim lacks such

precise language that would read on a statutory subject matter then how much of the specification in view of section 112, paragraph 6, should be read into the claims? Commentary suggests that if the applicant has not specifically recited a limitation than such limitations should not be imputed by the PTO or the Courts. For example, Robert L. Harmon115 cautions that the entire specification should not be read in the claims, and that the invention should be viewed in light of the claim language. Harmon states:

[c]laims are always construed in light of the specification, but that does not mean that the claims incorporate all disclosures of the specification. If everything in the specification were required to be read into the claims, or if structural claims were to be limited to devices operated precisely as a specification-described embodiment is operated, there would be no need for claims. . . . Nor would a basis remain for the statutory necessity that an application conclude his specification with claims particularly pointing out and distinctly claiming the subject matter that he regards as his invention. Just because a patent is narrow does not mean that claims are to be limited to the specific embodiments disclose in the specification.

Thus, what is patent is not restricted to the examples but is defined by the words in the claims if those claims are supported by the specification. Where a specification does not require a limitation, that limitation should not read into the claims. While it is entirely proper to use the specification to interpret what the patentee meant by a word or phrase in the claim, this is not to be confused with adding an extraneous limitation appearing in the specification, which is improper. Courts cannot alter what the patentee has chose to claims as his invention. No matter how great the temptations of fairness or policy making, courts do not rework claims. They only interpret them.116

The Reconsideration Board in its analysis noted that it could not impute limitations which could save a claim from being non-statutory.117 In addition, even during oral arguments concerning In re Alappat, questions regarding how much of the specification could be read into the claims were raised. Judge Nies raised the question of identical claims using "means for" limitations being be patented because of variations in its specification. Also, Judge Rich raises questions on whether applying section 112, paragraph 6 is essentially reading the entire specification into the claims.118

116. HARMON supra note 131 at 143 (citations omitted).
The majority decision, thus, concluded that "means for" language corresponds to its respective structures, and all "acts" therein as described in the specification. Such an interpretation raises the question of exactly how much of the specification may be imputed in to a means plus function claim?

III. NON-STATUTORY SUBJECT MATTER UNDER THE GUISE OF MEANS-PLUS-FUNCTION CLAIM

The Federal Circuit's rationale of imputing limitations into a "means for" claims that are not directly recited in the claims could allow patents to issue protecting non-statutory subject matter. Such a claim could pass the 35 U.S.C. section 101 inquiry under the guise of a means-plus-function claim, which might have an adverse effect in the computer software industry. Recently, a commentator has speculated that "[p]eople who ignored patents on Wall Street, people who ignored patents for financial systems, will have no choice but do deal with them now."119 Financial systems typically use general purpose computers (PC's) to calculate basic financial results. Now, claims having "means for" elements that only recite the basic structure of a general purpose computer (PC) and the function of performing a basic calculation by each structure could have exclusive rights to those well known calculations by being statutory because limitations from the specification describing how the results are to be used by something physical are imputed even if those limitations were never claimed.

Take for example a patent granted to an online computer database system that tabulates interests daily for all investments and displays the tabulated results in a unique bar graph form. Further, ignore all issues regarding novelty and obviousness. Assume that the specification provides for a circuit diagram of a general purpose computer comprising: Registers, ALU, Shift Registers, Microprocessor, and Computer Screen: all interconnected and that tabulated results under software control, and displayed the results on a computer screen in bar graph form.

Assume the hypothetical claim would read:

1. An online database system that tabulates interests daily for all investments and displaying the tabulated result in a bar graph form on a computer screen comprising:
   means for storing a first value [Register] representing investment comprising a plurality of binary digits;
   means for storing a second value [Register] representing interests comprising a plurality of binary digits;

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119. Teresa Riordan, A Federal Appeals Court Resolves a Thorny Issue: A Software Program is Patentable, N.Y. Times, Aug. 8, 1994, at 2.
means for storing a third value [Register] representing a result comprising a plurality of binary digits;
shifting means [Shift Register] for shifting the second value one binary digit and providing a shifted bit;
shifting means [Shift Register] for shifting the third value one binary digit;
means for adding [ALU] the first value to the value of said third value responsive to the shifted bit;
means for iteratively operating [Microprocessor] said shifting means and said adding means.

According to the Federal Circuit in Alappat, the display in the preamble would be given patentable weight in view of the specification, which would be imputed, as well as the corresponding circuit components and its interconnections whether they have been recited or not. This claim under close examination would essentially give protection to the basic operation of multiplying numbers in binary. In other words, the Federal Circuit decision would allow the granting of a patent on how digital computers multiply numbers. If the examining corps (PTO) uses the rationale of imputing limitations from the specification to save a claim from being non statutory and a patent right is granted, then it could possibly be applied in an infringement case where anyone multiplying numbers in a computer could possibly infringe.

The hypothetical claim essentially reads on all possible ways of performing the basic operation of multiplying numbers in binary. Multiplying numbers in binary involves shifting a multiplicand based on a shifted bit of a multiplier and adding the shifted multiplicand to a result. For example, multiplying binary numbers would occur as follows.

\[
11 \times 7 = 77 \text{ in binary would result in } 1011 \times 0111 = 1001101 \\
1011 \text{ multiplicand} \\
\times0111 \text{ multiplier} \\
1011 \text{ (result)} \\
1011 \text{ (shift multiplier and add to result if shifted multiplier bit is 1)} \\
100001 \text{ (result)} \\
1011 \text{ (iterate until last digit is shifted from multiplier)} \\
1001101 = 77 \text{ Decimal}
\]

Consequently, the rationale used by the Federal Circuit of imputing limitations in Alappat raises questions on how software patents are examined before the PTO like the hypothetical claim presented. In the hypothetical claim, there is no direct relationship between the means that perform the operation of multiplying numbers and the means that display the results in a unique bar graph form. Only in the specification would it describe such relationships under software control; however, if
such relationships are never claimed is it proper to infer such relationships into the claims? If it is proper, then a claim drafter could write claims to basic components of a general purpose computer performing a particular function without adding any limitations on how they are positively related to each other, and recite in the specification how software is used to process those results. Thus, software essentially details how the means are “interrelated” which, according to the Federal Circuit, is proper to impute such limitations in a means claim as sanctioned by 35 U.S.C. section 112, sixth paragraph.

In addition, determining “what exactly is the claimed invention” differs under the rationale used the Federal Circuit. Interpreting the hypothetical claims as written would protect the basic operation of multiplying numbers in binary. Interpreting the hypothetical claim under the rationale given by the Federal Circuit in Alappat would lead to invention of a unique type of circuit configuration implemented in a general purpose computer with specific connections as described in the specification wherein a display means is connected in such a way to receive the calculated results and displays the results in a unique bar graph form all under software control.

According to this interpretation, an examiner at the PTO would have to search for specific circuit relationships and interrelatedness (i.e. connections), and a display means displaying a specific type of bar graph of calculated interest rates. Such an examination leads away from searching for the heart of an invention that has been claimed. The claimed invention really isn’t the type of bar graph being display nor the display means displaying the results, but the actual procedure of multiplying binary numbers. Searching for specific interconnections directs attention away from understanding what exactly is the claimed invention to trying to search for identical figures and diagrams with specific structure (or equivalents) connected in a specific way.

Furthermore, inventors wish to gain the broadest scope possible for their inventions, thus, what a patent has exclusive rights for must be consistent with what has be examined before the PTO. Thus, how 35 U.S.C. section 112, sixth paragraph, is practiced is of vital importance especially in software patents because general purpose computers use essentially the same type of components (i.e. cpu, registers, alu’s, etc) in essentially the same way. So, a general purpose computer given exclusive rights for a certain type of operation could possibly exclude all general purpose computers from performing that certain type of operation. Exclusive rights to mathematical algorithms even under the operation of a general purpose computer controlled by software should not be granted because structure has been claimed that performs those operations, and limitations imputed form the specification that applies the results of
those operations by a physical structure to save it from being non-statutory when such limitations have not been recited.

CONCLUSIONS

The majority in Alappat suggests that it is proper to impute limitations from the specification to corresponding “means for” elements, even if it has not been specifically recited in the body of a claim. Such claim interpretation may cause confusion on how much of the specification is to be imputed in view of section 112, paragraph 6. In an already complex area of determining patentability of computer software inventions, the possibility of non-statutory subject matter being patented under the guise of a “means for” claim is unfortunately increased.

New guidelines are being decided at the PTO on how to deal with software patent applications that are part of a physical structure (floppy disk, computer) which have been based on the following court cases In re Lowry (claims to a data structure are patentable);\textsuperscript{120} In re Beauregard (claims to a computer program product);\textsuperscript{121} and In re Alappat (programmed computer becomes a new machine). However, the PTO has to be careful in following Alappat regarding 35 U.S.C. section 112, sixth paragraph because it essentially undermines the basic principle of examination. Alappat shifts the focus of finding the inventive concept or idea in a claimed invention to finding the particular implementation of the idea in the specification.\textsuperscript{122} Accordingly, the PTO needs to further define exami-

120. 32 F.3d 1579 (Fed. Cir. 1994).
121. 53 F.3d 1583 (Fed. Cir. 1995).
122. A simple illustration provides insight on how the court’s ruling undermines this basic principle. For example, a simple apparatus claim with a specification describing a temporary holding means (i.e. tank of water) having an input valve for inputting water and a output valve for outputting water where the rate outputting water is faster than the rate of inputting water. The claim, thus, being as follows:

An apparatus for temporarily holding a unit with a continuous flow of the unit into and out of said holding means comprising:

means for holding a unit comprising:

input means for receiving a continuous flow of the unit;

output means for outputting a continuous flow of the unit; and

wherein said input means receives a continuous flow of said unit at a first rate and said output means outputs a continuous flow of said unit at a second rate; and

wherein said second rate is faster than said first rate.

During examination, an examiner would ask the question “what exactly is the inventive concept or idea?” ignoring the specifics of each means as detailed in the specification, but giving a very broad interpretation for each “means for” element to determine exactly what the claimed invention is. Using a very broad interpretation, the examiner would have deduced the following:

The claimed invention is simply an apparatus to prevent OVERFLOW from occurring. Specifically, if you input water into a tank at a continuous rate faster than you drain the tank, the tank will overflow with water. Thus, to prevent water from overflowing, the output rate should be faster than the input rate.
nation procedures after the Alappat ruling.

Finally, the Federal Circuit, also, concludes that a programmed "general purpose computer" becomes a "special purpose computer" or a "new machine." This rationale should be taken with extreme caution, especially, when dealing with mathematical algorithms. As reasoned by Chief Judge Archer in his dissenting opinion, by way of an analogy to music; he illustrates that music should not be patented simply because it has been placed on a type of physical structure like a "compact disc," which he states:

[t]hrough the expedient of putting his music on known structure, can a composer now claim as his invention the structure of a compact disc. . . . The answer must be no. The composer admittedly has invented or discovered nothing but music. The discovery of music does not become patentable subject matter simply because there is an arbitrary claim to some structure.

Similarly, regarding claims to a programmed general purpose computer, one must always remember that the form of a claim is not dispositive. A claim in substance that would protect non-statutory subject matter (i.e., mathematical algorithms) should not be granted exclusive rights to such subject matter under the guise of structure.

As an examiner, using a very broad interpretation for each "means for" element, the focus of attention is to look for the inventive concept or idea and how it is applied by a physical structure. The claim as written broadly encompasses any type of holding means with an input means and an output means having the output means output a unit faster that it input means inputting a unit. Furthermore, the claim, which has a very broad scope, attempts to gain exclusive rights on the WHOLE IDEA OF PREVENTING OVERFLOW for a holding means which should be granted if the inventor was the first to think or recognize the idea or concept and applied it with some physical structure.

Now, what the Federal Circuit has clearly stated is that we cannot ignore the 35 U.S.C. section 112, sixth paragraph, statute that requires each "means for" element corresponds to its description in the specification including its relationships and interrelatedness. This would preclude an examiner FROM searching for any prior art that prevented overflow in a holding means having an output rate faster than an input rate TO searching for a specific water tank with specific input valves and outputs valves having a specific relationships and interrelatedness to the water tank (or equivalents thereof) as described in the specification.

This type of claim interpretation limits the scope of a claimed invention, and puts an excessive amount of burden on examination where it is very unlikely to find identical implementations. Furthermore, the examination procedure essentially becomes matching diagrams with diagrams totally ignoring the inventive idea or concept.
