THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

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opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 21

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MICHAEL PETERS

Appeal No. 95-2652
Application 07/754,899[1]

HEARD: June 4, 1996

Before HARKCOM, Vice Chief Administrative Patent Judge, and HAIRSTON and BARRETT, Administrative Patent Judges.

BARRETT, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the final rejection of claims 1-11, all the claims pending in the application.

[1] Application for patent filed September 4, 1991, entitled "Fault Identification System."

The invention is directed to an electrical circuit fault diagnosis system and method. A circuit specification describing the components and all the interconnections is stored in a data base. This stored data is used to calculate expected electrical parameter values, which are compared to measured values to determine the most likely faulty component.

Claim 1 is reproduced below.

> 1. A system for identifying faults in an electrical circuit intended to provide a plurality of outputs, each output being in response to at least one predetermined set of circuit conditions, the system comprising
>
> a) means storing data describing individual components of an electrical circuit and interconnections at circuit nodes between said components that together define the topology of the electrical circuit,
>
> b) means for inputting data to the system identifying a fault symptom indicating that, for one predetermined set of said circuit conditions, an intended output is not received or measured,
>
> c) means for accessing stored data describing the electrical characteristic of selected components of said circuits a fault in any one of which said selected components could be a cause of the said fault symptom,
>
> d) means for directly calculating, from the accessed data describing electrical characteristics of said selected components, expected electrical parameter values at predetermined measurement points in a non-defective sub-circuit defined by said selected components and said interconnections therebetween given the said predetermined set of circuit conditions,
>
> e) means for selecting measurement points in said sub-circuit at which points said electrical parameter values are to be measured,

f) means for selectively inputting measurement data indicating the electrical parameter values measured at said selected measurement points,

g) means for providing a comparison of said input measurement data with said calculated expected electrical parameter values, and

h) means for identifying at least one most likely faulty component from the comparison of said input measurement data with said calculated expected electrical parameter values.

The examiner relies on the following reference:

Baker et al. (Baker) 4,847,795 July 11, 1989

Claims 1-8 and 10 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Baker.

Claims 9 and 11 stand rejected under 35 U.S.C. § 103 as being unpatentable over Baker.

We refer to the Examiner's Answer entered January 10, 1995 (Paper No. 18) for a detailed statement of the examiner's rejection.

OPINION

We reverse.

Appellant argues that Baker does not disclose "means for directly calculating . . . expected electrical parameter values at predetermined measurement points," as recited in paragraph d) of claim 1 and in corresponding limitations in independent claims 8 and 10. The examiner's position is that Baker

inherently includes the means and capability to perform the function (Examiner's Answer, page 4):

> Further, a means for calculating expected electrical characteristics at predetermined measurement points in a non-defective sub-circuit is not explicitly taught by Baker, however, Baker does inherently include the means and capability to perform this function because in order to accomplish the following diagnosis step - which is, "the functional test specifications section 34 asks the domain expert (software) to identify the name of each test as well as the test limits which are used to determine whether the electronic assembly 12 is defective," see col. 3, lines 60-63, Baker would need to have the capability to calculate the test limits from the known circuit parameters (actual circuit component values and circuit node connections) stored in the knowledge base.

We disagree with the examiner's finding. Inherency requires that a structure or function be inevitably present. In re Oelrich, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981) ("the disclosure is sufficient to show that the natural result flowing from the operation as taught would result in the performance of the questioned function"). Baker does not inherently have means for calculating as recited in the claims.

Baker discloses an expert system for diagnosing defects in electronic assemblies. In Baker, a domain expert (a human being having expertise in the problem domain) provides information to three sections of the modeling subsystem: the functional block definition section 30, the removable subassembly definition section 32, and the functional test specifications section 34.

Baker describes the sections as follows (column 3, lines 37-68).

> In the functional block definition section 30, the domain expert is asked to divide the electronic assembly 12 into blocks by function. For example, the domain expert may divide the electronic assembly into blocks which perform digital filtering functions, logical operations, or signal amplification functions. In addition, the functional block definition section 30 also requests that the domain expert provide information concerning the relative dependence of the functional blocks with respect to each other. For example, the domain expert may note that the failure of functional block A will cause the output of functional block B to depart from the test specifications during testing.
>
> In the removable subassembly definition section 32, the domain expert is asked to identify which removable subassemblies form each functional block. For example, the domain expert may be asked to identify the removable subassemblies which form a digital filter functional block. The removable subassemblies identified by the domain expert may be a single component or a collection of components depending on whether the individual components can be replaced when the recommended repair procedure is implemented.
>
> The functional test specifications section 34 asks the domain expert to identify the name of each test as well as the test limits which are used to determine whether the electronic assembly 12 is defective. The test limits may be either the upper and lower limits of an analog signal, or a pass vector if the signal is digital. In addition, the functional test specification section 34 asks the domain expert to identify the functional block(s) to which each test is directed.

Initially, we agree with appellant's arguments (Brief, pages 12-13) that it is not clear that the functional block definition meets the limitation in paragraph a) of claim 1, of "means storing data describing individual components of an electrical circuit and interconnections at circuit nodes between said components that together define the topology of the

electrical circuit." The functional blocks apparently just form a list of named blocks with no descriptions of electrical properties of the individual components, and with no descriptions of interconnections defining a circuit topology. While some functional dependence may be specified, this does not amount to a description of the circuit topology. Thus, it does not appear that Baker has the kind of data that would permit calculating "expected electrical parameter values at predetermined measurement points in a non-defective sub-circuit."

As we understand Baker, the test limits set by the human domain expert are not in any way inherently calculated based on the data provided in the functional block definition or the removable subassembly definition. For example, the domain expert might define an amplifier block in the functional block section, define the amplifier to be by itself on a removable circuit card in the removable subassembly section, and specify a set of test limits (e.g., gain, bandwidth, signal to noise ratio, etc.) in the functional test specifications section. The test limits can be based on past measurements, specifications of the blocks from manufacturer's data sheets, the experience of the domain expert, or other ways not involving calculation. There is no factual basis on which to conclude that the test limits are calculated from the functional block information, which are apparently just names, not circuit descriptions. Circuit simulators to perform

network analysis using basic electrical elements as their primitives, such as the Berkeley SPICE program, are well known in the art; however, if such a program were involved in Baker we believe it would be described in less speculative terms. Where there are other structures or ways to perform a described function or operation, a finding of inherency is not supported. Thus, we find that Baker does not inherently have "means for calculating" as recited in claims 1 and 10 or inherently perform the step of "calculating" as recited in claim 8.

The examiner has stated that "a calculation (inherently) must be performed to determine whether a test limit has been exceeded or not, also, Baker further teaches explicitly, that calculations of expected parameters are performed, see col. 4, lines 59-62" (Examiner's Answer, page 8). The referenced portion of Baker states (column 4, lines 59-62): "Parametric distance is the summation for all tests of the amount that an output exceeds its passing range divided by the breadth of the passing range." The terms "summation" and "divided" clearly indicate calculation; however, this is not the calculation of expected electrical parameter values in the claims, but is some other calculation after measurements have been taken. Thus, this does not affect our finding that Baker does not inherently have "means for calculating" or inherently perform the step of "calculating."

Since we find that Baker does not inherently calculate from stored data on electrical components and their interconnections, we must also find that Baker does not meet the further claim limitations of comparing measured values to calculated values.

For the reasons enumerated above, the rejection for anticipation of claims 1-8 and 10 must be reversed. The obviousness rejection of dependent claims 9 and 11 does not cure the deficiencies in rejection of the independent claims from which they depend and, accordingly, the rejection for obviousness of claims 9 and 11 is also reversed.

REVERSED

GARY V. HARKCOM
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