

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opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.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. 12

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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**Ex parte** MAURICE A. KIRCHBERG

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Appeal No. 1997-0211  
Application No. 08/252,288<sup>1</sup>

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ON BRIEF

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Before HAIRSTON, FLEMING, and DIXON, **Administrative Patent Judges**.  
DIXON, **Administrative Patent Judge**.

**DECISION ON APPEAL**

This is a decision on appeal from the Examiner's final rejection of claims 1-14, which are all of the claims pending in this application.

We AFFIRM-IN-PART.

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<sup>1</sup> Application for patent filed May 18, 1994.

## BACKGROUND

The appellant's invention relates to a power conversion system for converting D.C. to A.C. with reduced harmonics in the A.C. power. The system uses prediction rather than feedback. An understanding of the invention can be derived from a reading of exemplary claims 1 (Group 1) and 3 (Group 2), which are reproduced below.

1. An inverter system comprising:

inverting means for inverting input DC power into output AC power having a fundamental frequency wherein the inverting means produces a variable width pulse and wherein the variable width pulse has a switching angle;

predicting means, responsive to the inverting means, for predicting a first quantity related to a harmonic of the fundamental frequency if the switching angle is varied, and for predicting a second quantity related to the harmonic of the fundamental frequency if the switching angle is unvaried; and,

means, connected to the inverting means and to the predicting means, for controlling the inverting means so as to vary the switching angle if the first quantity is closer to a desired level than is the second quantity and so as not to vary the switching angle if the second quantity is closer to a desired level than is the first quantity.

3. An inverter system comprising:

inverting means for inverting input DC power into output AC power having a fundamental frequency wherein the inverting means produces a variable width pulse, wherein the variable width pulse has a switching angle in a present cycle of the output AC power, and wherein the inverting means has an inverter signal;

integrating means for integrating, beginning at the switching angle in a present cycle of the output AC power, a product of the inverter signal and a sine

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function to produce a first integrated quantity wherein the sine function has a frequency of a harmonic of the fundamental frequency, and for integrating, beginning at the switching angle in the present cycle of the output AC power, a product of the inverter signal and a cosine function to produce a second integrated quantity wherein the cosine function has the frequency of the harmonic of the fundamental frequency;

predicting means, responsive to the integrating means, for predicting varied first and second integrated quantities in a subsequent cycle of the output AC power if the switching angle is varied, and for predicting unvaried first and second integrated quantities in the subsequent cycle of the output AC power if the switching angle is unvaried; and,

means, connected to the inverting means and responsive to the predicting means, for controlling the inverting means so as to vary the switching angle in the subsequent cycle of the output AC power if the varied first and second integrated quantities are each closer to a desired level than are the unvaried first and second integrated quantities, and so as not to vary the switching angle in the subsequent cycle of the output AC power if the unvaried first and second integrated quantities are each closer to a desired level than are the varied first and second integrated quantities.

The prior art references of record relied upon by the Examiner in rejecting the appealed claims are:

Kislovski	5,045,771	Sep. 03, 1991
Maddali et al. (Maddali)	5,327,335	Jul. 05, 1994
		(Filed Sep. 28, 1992)

Claims 1-14 stand rejected under 35 U.S.C. § 103 as being unpatentable over Maddali in view of Kislovski.

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Rather than reiterate the conflicting viewpoints advanced by the Examiner and the appellant regarding the above-noted rejections, we make reference to the Examiner's answer (Paper No. 11, mailed Aug. 8, 1996) for the Examiner's complete reasoning in support of the rejections, and to the appellant's brief (Paper No. 10, filed Jun. 24, 1996) for the appellant's arguments thereagainst.

### **OPINION**

In reaching our decision in this appeal, we have given careful consideration to the appellant's specification and claims, to the applied prior art references, and to the respective positions articulated by the appellant and the Examiner. As a consequence of our review, we make the determinations which follow.

### **GROUP 1**

Appellant argues that the Examiner has not presented a *prima facie* case of obviousness with respect to claim 1 (GROUP 1). (See brief at pages 14-20.) We disagree with appellant. The Examiner has presented a case of obviousness of the claims in Group 1, albeit brief and succinct. (See final rejection at pages iii-iv.) The Examiner's position is basically that Maddali teaches essentially the same basic power

converter as disclosed by appellant as evidenced by the similar figures and same motivation to reduce harmonics discussed in the specification of Maddali.<sup>2</sup> Further, the Examiner asserts that it would have been obvious to one of ordinary skill in the art to use a feedforward or predictive system as taught by Kislovski for better control of the system than a feedback system would provide as taught by Maddali. We agree with the Examiner with respect to the basic use of a predictive system. Maddali also discloses that the switching angle is related to the output (See Maddali at col. 5, lines 21-27) and that the “switching angles [are] determined by the result of comparing the composite waveform  $Y_{CA}$  to the triangular waveform. As the harmonic content in the output of the inverter changes, the composite waveform  $Y_{CA}$  changes and the switching angles of the PWM pulses consequently change.” (See Maddali at col. 7, lines 57-62.) Clearly, Maddali teaches there is a relationship of the switching angles to the output of the power converter.

Kislovski teaches a system for preventing transients from damaging a switching regulator by use of predictive control. The system predicts the relevant values for use in controlling the system. The “emergency control circuit” predicts in each time period

the size of the maximum current and intervenes to control when needed. (See Col. 4.)

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<sup>2</sup> We note that the values used at the output are different for the instant disclosed invention in Fig. 1 as compared to Fig. 1 of Maddali, but this feature is not found in claim 1.

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Due to the nature of the device, the system uses the “Law of mathematic Induction” to determine the appropriate computations.

The Examiner provides a convincing line of reasoning to combine the teachings in the rejection. Therefore, we disagree with appellant that the Examiner has not provided a line of reasoning for the motivation to combine the references. (See brief at page 15.)

Appellant argues that there is a difference between the present invention and Kislovski in that the present invention is for the “normal control” and Kislovski is directed to “emergency control.” (See brief at pages 15-16.) We find no basis in the claim language for this argument and appellant has not identified any language in the claim to limit the claimed invention to “normal control.” This argument is not persuasive.

Appellant argues that the claims “require a system which produces an output waveform having low harmonic content,” but does not identify any language in claim 1 to support this argument. (See brief at page 16.) This argument is not persuasive.

Appellant argues that the proposed combination renders Kislovski inoperative for its intended purpose. Further, appellant argues that the “Law of mathematic Induction” will not determine the appropriate quantities. (See brief at pages 16-17.)

We disagree with appellant's arguments directed to the singular reference which neglect to consider the Maddali reference in the discussion/evaluation. Clearly, skilled artisans would have realized that it is the system of Maddali which is being modified and that the basic relationships thereto would have been used in the prediction. This argument is not persuasive.

Appellant argues that there is no reasonable expectation of success to "continuously control the switching angles of the switches to produce an output ac [sic] waveform which has optimized switching angles." (See brief at page 18.) Again appellant has not identified language in the claim to support this argument, and we find no clear support in the language of claim 1 to support the argument with respect to continuous control. Therefore, this argument is not persuasive.

Appellant argues that the references do not teach "the prediction of two different quantities related to the harmonic of the output waveform based upon two different switching angle configurations as required by the Applicant's claimed invention." (See brief at page 19.) Appellant argues that the references do not teach or suggest "means for predicting a first quantity . . ." Here, appellant argues the language of claim 1. (See brief at pages 19-20.) The language of claim 1 with respect to prediction is quite broad. The language of claim 1 requires only that two quantities be determined related

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to a harmonic of the fundamental frequency wherein one quantity corresponds to the varied switching angle and the other quantity corresponds to the unvaried switching angle. We disagree with appellant with respect to the lack of a *prima facie* case of nonobviousness. The Examiner has set forth the argument that one skilled in the art would have predicted any desirable quantity depending on the intended use of the system. (See final rejection at page ii.) We agree with this general premise. Therefore, the general premise of calculating two quantities with respect to the switching angle would have been obvious as the Examiner suggests in light of the disclosure by Maddali that the switching angle changes with the output. Furthermore, as a general premise, the control of the switching angle would have been based upon the relative closeness of the predicted values to some desired or preset value. Having the switching angle vary when the varied prediction is better and vice versa when the unvaried prediction is not better would have been the most basic control. Therefore, this argument is not persuasive.

Appellant argues that “Kislovski does not teach or suggest the prediction of two variables, one based on one set of switch operating parameters and the other based on a different set of operating parameters. . . . to determine the better of the two operating parameters for selection and use in the succeeding cycle.” (See brief at page 20.)

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Appellant does not identify the specific language in claim 1 to support this argument, and we find no clear support in the language of claim 1 for this detailed argument.

Therefore, this argument is not persuasive.

“On appeal to the Board, an applicant can overcome a rejection by showing insufficient evidence of *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness.” **In re Rouffet**, 149,F.3d 1350, 1355, 47 USPQ2d 1453, 1455 (Fed. Cir. 1998). As discussed above, appellant has not adequately rebutted the Examiner’s *prima facie* case of obviousness nor provided any evidence of secondary considerations. Therefore, we will sustain the rejection of independent claim 1 and dependent claims 2 and 6-8 grouped therewith.

## **GROUP 2**

Appellant argues that the Examiner has not presented a *prima facie* case of obviousness with respect to claim 3 (GROUP 2). (See brief at pages 20-22.) We

agree with appellant that the Examiner has not addressed the limitations of claim 3. While we do find that Maddali does teach the use of integrators in the power inverter system, the Examiner has not addressed these limitations. The Examiner has merely incorporated the final rejection into the answer and provided no responses to the

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appellant's arguments made in the appeal brief, and we will not speculate as to the proper application of the art to the claims. Since the Examiner has not adequately addressed the limitations of the claims, the Examiner has not presented a ***prima facie*** case of obviousness, and we will not sustain the rejection of claim 3 and claims 4, 5 and 9-14 grouped therewith which contain limitations to the integrating means.

### **CONCLUSION**

To summarize:

the decision of the Examiner to reject claims 1, 2 and 6-8 under 35 U.S.C. § 103 is affirmed; and the decision of the Examiner to reject claims 3-5 and 9-14 under 35 U.S.C. 103 is reversed.

The Examiner's decision is affirmed-in-part.

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No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

**AFFIRMED-IN-PART**

KENNETH W. HAIRSTON	)	
Administrative Patent Judge	)	
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	)	
	)	
	)	BOARD OF PATENT
MICHAEL R. FLEMING	)	APPEALS
Administrative Patent Judge	)	AND
	)	INTERFERENCES
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	)	
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JOSEPH L. DIXON	)	
Administrative Patent Judge	)	

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