UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte WILLIAM T. NEWPORT and JAMES LEE VAN OOSTEN

Appeal 2009-006047
Application 10/877,237
Technology Center 2100

Decided: August 18, 2009


LUCAS, Administrative Patent Judge.

DECISION ON APPEAL

1 Application filed June 25, 2004. The real party in interest is International Business Machines Corporation.
STATEMENT OF THE CASE

Appellants appeal from a final rejection of claims 1 and 3-20 under authority of 35 U.S.C. § 134(a). The Board of Patent Appeals and Interferences (BPAI) has jurisdiction under 35 U.S.C. § 6(b). Claim 2 was cancelled.²

Appellants’ invention relates to a method, apparatus, system, and signal-bearing medium for efficiently handling input/output (I/O) transmissions across communications channels. (Spec. 2, ll. 23-24.) In the words of the Appellants:

Data transfers to communications channels can be implemented using either blocking or non-blocking I/O. … Blocking I/O typically has faster response times and works well for smaller numbers of concurrently open connections than does non-blocking I/O. … [N]on-blocking I/O scales to much larger numbers of concurrent connections, but trades off response time to gain this scalability. … [Appellants’ invention switches] between blocking I/O and non-blocking I/O based on the number of concurrent connections. . . . In this way, I/O may be optimized depending on the number of concurrent connections, which increases performance.

(Spec. 2, l. 3 to 3, l. 12.)

² The limitations of claim 2 were incorporated in claim 1 in the amendment Appellants’ filed 11/14/2007.
Claims 1, 6, and 11 are exemplary:

1. A method comprising:

   receiving a request for a new communication connection from a client for a protocol via a network;

   switching between blocking I/O and non-blocking I/O for the protocol based on a number of concurrent communication connections for the protocol, wherein the blocking I/O comprises each of the concurrent communication connections for the protocol that is processed by its own thread that transfers data to the respective communication connection, and wherein the non-blocking I/O comprises all of the concurrent communication connections for the protocol are processed by a same thread that transfers the data to the communication connections, wherein the switching between the blocking I/O and the non-blocking I/O further comprises switching from the blocking I/O to the non-blocking I/O if the number of concurrent communication connections is greater than a first threshold, wherein the new communication connection and the concurrent communication connections comprise open channels to entities via the network, and wherein the same thread comprises a programming unit scheduled for execution on a processor.

6. An apparatus comprising:

   means for receiving a request for a new communication connection from a client for a protocol via a network;

   means for switching from blocking I/O to
non-blocking I/O for the protocol if a number of concurrent communication connections for the protocol is greater than a first threshold, wherein the blocking I/O comprises each of the concurrent communication connections for the protocol that is processed by its own thread that transfers data to the respective communication connection, and wherein the non-blocking I/O comprises all of the concurrent communication connections for the protocol are processed by a same thread that transfers the data to the communication connections, wherein the same thread comprises a programming unit scheduled for execution on a processor; and

means for switching from the non-blocking I/O to the blocking I/O for the protocol if the number of concurrent communication connections for the protocol is less than a second threshold, wherein the new communication connection and the concurrent communication connections comprise open channels to entities via the network.

11. A signal-bearing medium encoded with instructions, wherein the instructions when executed comprise:

receiving a request for a new communication connection from a client for a protocol via a network;

switching from blocking I/O to non-blocking I/O for the protocol if a number of concurrent communication connections for the protocol is greater than a first threshold, wherein the blocking I/O comprises each of the concurrent communication connections for the protocol that is processed by its own thread that transfers data to
the respective communication connection, and wherein the non-blocking I/O comprises all of the concurrent communication connections for the protocol are processed by a same thread that transfers the data to the communication connections, wherein the same thread comprises a programming unit scheduled for execution on a processor; and

switching from the non-blocking I/O to the blocking I/O for the protocol if the number of concurrent communication connections is less than a second threshold, wherein the new communication connection and the concurrent communication connections comprise open channels to entities via the network.

The prior art relied upon by the Examiner in rejecting the claims on appeal is:


REJECTION

The Examiner rejects the claims as follows:

Claims 1 and 3-20 stand rejected under 35 U.S.C. 102(b) for being anticipated by Bonola. (Ans. 3, middle.)

Groups of Claims:

Group I: Claims 1 and 3-5 are drawn to a method for switching between blocking and non-blocking input/output (I/O). Claim 1 is representative.
Group II: Claims 6-20 are drawn to an apparatus, signal-bearing medium, and computer system for switching between blocking and non-blocking I/O. Claims 6 and 11 are representative.

Claims are discussed in the order of the two groupings, with claims 1, 6, and 11 representative.

Appellants contend that the claimed subject matter is not anticipated by the Bonola reference because Bonola fails to teach the claimed “switching between blocking I/O and non-blocking I/O for the protocol based on a number of concurrent communication connections for the protocol” and other limitations of the claim. (Br. 22-23.) The Examiner contends that each of the two groups of claims is properly rejected. (Ans. 3 and 14.)

Rather than repeat the arguments of Appellants or the Examiner, we make reference to the Brief and the Answer for their respective details. Only those arguments actually made by Appellants have been considered in this opinion. Arguments that Appellants could have made but chose not to make in the Brief have not been considered and are deemed to be waived. See 37 C.F.R. § 41.37(c)(1)(vii) (2006).³

³ Appellants have not presented any substantive arguments directed separately to the patentability of the dependent claims or related claims in each group, except as will be noted in this opinion. In the absence of a separate argument with respect to those claims, they stand or fall with the representative independent claim. See In re Young, 927 F.2d 588, 590 (Fed. Cir. 1991).
We affirm-in-part.

ISSUE

The issue is whether Appellants have shown that the Examiner erred in rejecting the claims under 35 U.S.C. § 102(b). The issue turns on whether Bonola teaches the claimed “switching between blocking I/O and non-blocking I/O for the protocol based on a number of concurrent communication connections for the protocol” and other claim 1 limitations.

FINDINGS OF FACT

The record supports the following findings of fact (FF) by a preponderance of the evidence.

1. Appellants have invented a method for efficiently handling input/output (I/O) loads. (Spec. 3, ll. 1-3.) The method includes switching between two types of communications requests depending on the data transfer loads on the computer system. (Spec. 2, ll. 3-4 and 3, ll. 6-8.) One request handling method, called blocking I/O, which uses a separate processing thread for each channel, is useful when few communications requests are made concurrently. (Spec. 2, ll. 8-9.) In blocking I/O, the channels not being processed are blocked until the channel being processed is complete. (See Spec. 2, ll. 4-9.) This may cause delays if there are many channels. (Id.) A second request handling method, known as non-blocking I/O, is preferable when numerous requests require concurrent processing. (Spec. 2, ll. 17-18.) In non-blocking I/O, multiple processing threads run simultaneously. (Spec. 2, ll. 15-17.)
Switching from blocking I/O to non-blocking I/O occurs when a threshold for communications requests is surpassed. (Spec. 3, ll. 8-9.)

2. The Bonola reference’s background teaches that both blocking and non-blocking are in the prior art. (See ¶¶ [0008] and [0009] concerning blocking; see also ¶¶ [0010] and [0011] concerning non-blocking.) Bonola’s device is strictly non-blocking, but of two types – cache compatible and non-cache compatible. (See ¶¶ [0013], [0031], and [0032].)

PRINCIPLES OF LAW

In rejecting claims under 35 U.S.C. § 102, “[a] single prior art reference that discloses, either expressly or inherently, each limitation of a claim invalidates that claim by anticipation.” Perricone v. Medicis Pharm. Corp., 432 F.3d 1368, 1375-76 (Fed. Cir. 2005) (citation omitted).

Our reviewing court states in In re Zletz, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) that “claims must be interpreted as broadly as their terms reasonably allow.”

“The plain and unambiguous meaning of [35 U.S.C. § 112,] paragraph six is that one construing means-plus-function language in a claim must look to the specification and interpret that language in light of the corresponding structure, material, or acts described therein, and equivalents thereof, to the extent that the specification provides such disclosure.” In re Donaldson Co., Inc., 16 F.3d 1189, 1193 (Fed. Cir. 1994)
ANALYSIS

From our review of the administrative record, we find that Examiner has presented a prima facie case for the rejections of Appellants’ claims under 35 U.S.C. § 102(b). The prima facie case is presented on pages 3 to 11 of the Examiner’s Answer. In opposition, Appellants present a number of arguments. (Br. 22-23.)

**Group I: Arguments with respect to the rejection of claims 1 and 3-5 under 35 U.S.C. § 102(b)**

Appellants contend that the Examiner erred in rejecting exemplary claim 1 because Bonola does not teach “receiving a request for a new communication connection from a client for a protocol via a network,” as claimed. (Br. 22, middle.)

In reply, the Examiner points out that Bonola teaches a concurrent request. (Ans. 3, middle.) The Examiner says that Bonola’s request for access to a shared resource is the same as the claimed “request for a new communication connection.” (Ans. 12, top.) According to the Examiner, Appellants’ claimed “request for a new communication connection” is the same as Bonola’s request because each of Bonola’s requests is a new request to communicate. (Id.) The Examiner finds that the claim does not require either a particular sender or receiver of the claimed “request.” (Id.) Read broadly but reasonably, see In re Zletz, cited above, we find that the claimed request does indeed read on Bonola’s request. Accordingly, we decline to find error.
Next, Appellants argue that Bonola’s background art describing a bus arbitration scheme fails to teach Appellants’ claim limitation “receiving a request for a new communication connection from a client for a protocol via a network.” (Br. 22, middle.) Appellants’ argument is ineffective for the following reasons. We find that the background art of Bonola teaches a bus arbitration scheme for locking out later communications requests in favor of earlier communications requests. The scheme taught by Bonola’s background art is the same as Appellants’ claimed “blocking I/O.” (“The arbitration scheme typically results in a lock being placed on the critical region of the shared resource such that the other requesters are blocking until the current requester has completed the operation and released the lock” ¶ [0008].)

Appellants’ argument that Bonola’s bus arbitration scheme fails to meet Appellants’ claim limitation “receiving a request for a new communication connection from a client for a protocol via a network” is ineffective, in that the bus arbitration scheme in the background art of Bonola teaches a different claim element (i.e., Appellants’ claimed blocking I/O) than the one Appellants argued above. (Id.)

Appellants contend that Bonola does not teach “‘wherein the non-blocking I/O comprises all of the concurrent communication connections for the protocol are processed by a same thread . . . wherein the same thread comprises a programming unit scheduled for execution on a processor’ because non-cache coherent entity is ‘hardware’ and not a ‘programming unit scheduled for execution on a processor.’” (Br. 22, bottom.)
The Bonola reference’s background teaches that both blocking and non-blocking are in the prior art. (FF#2.) Bonola’s device is strictly non-blocking, but of two types – cache compatible and non-cache compatible. (Id.) We note that Bonola teaches improvements in non-blocking methods at paragraphs [0031] and [0032]. Bonola’s improvements concern a software type (Bonola’s cache coherent entity) and a hardware type (Bonola’s non-cache coherent entity). (Id.) Bonola’s detailed description of non-blocking methods for cache coherent (e.g., software threads) and non-cache coherent entities (e.g., hardware) at paragraphs [0031] and [0032] do teach Appellants’ claimed “non-blocking I/O” because Bonola teaches a “technique [non-blocking I/O] that does not employ locks [blocking I/O].” (Bracketed material added; see Bonola, ¶¶ [0013] and [0030].) Since Bonola’s cache coherent and non-cache coherent entities are merely two variants of Appellants’ claimed “non-blocking I/O” by another name, the reference’s teachings meet Appellants’ claim limitation “wherein the non-blocking I/O comprises all of the concurrent communication connections for the protocol are processed by a same thread … wherein the same thread comprises a programming unit scheduled for execution on a processor.” (Id.) Thus, we decline to find error.

Appellants further argue that Bonola fails to teach “data to the respective communication connection . . ., wherein the new communication connection and the concurrent communication connections comprise open channels to entities via the network.” (Br. 22, bottom.) The Examiner finds that Bonola’s access paths for communications read on Appellants’ “open channels to entities via the network.” (Ans. 13, middle.) In Bonola, the
access paths shown as dashed lines in Figure 3 are channels for communications. (Id.) In other words, Bonola’s access paths are routes for data traveling from place to place. (Id.) Reading exemplary claim 1 broadly but reasonably, we find that Appellants’ open channels do read on Bonola’s access paths as shown in Figure 3 of Bonola.

Appellants further argue that Bonola does not teach “switching from the blocking I/O to the non-blocking I/O if the number of concurrent communication connections is greater than a first threshold,” as recited in exemplary claim 1. (Br. 23, middle.)

Under 35 U.S.C. § 102, “[a] single prior art reference that discloses, either expressly or inherently, each limitation of a claim invalidates that claim by anticipation.” (See Perricone, cited above.) In this case, we find that Bonola inherently teaches the claimed “switching from the blocking I/O to the non-blocking I/O” limitation for the following reasons. As stated above, Bonola’s background teaches that both blocking and non-blocking are in the prior art. (FF#2.) Specifically regarding blocking I/O, the background of Bonola teaches handling communications requests via a bus arbitration scheme. (See ¶ [0008].) The bus arbitration described in Bonola’s background is a first-come, first-serve scheme that handles an earlier communications request, while locking out, or blocking, a later communications request until the first request is finished processing. (Id.) Bonola’s background also teaches a non-blocking scheme capable of handling more numerous requests for communications than the blocking scheme can efficiently handle. (See ¶ [0010].)
By identifying the shortcomings of locking out later requesters in favor of earlier requesters under Bonola’s bus arbitration scheme (Appellants’ claimed “blocking I/O”), we find that Bonola inherently teaches that a user would have known to switch to an improved non-blocking scheme, such as the one Bonola teaches in paragraphs [0031] and [0032]. (See also Bonola, ¶¶ [0013] and [0030].) In other words, Bonola inherently teaches switching from blocking I/O where Bonola identifies a problem in the art (i.e., a lack of scalability for numerous requesters making concurrent requests) in the background of the reference and addresses the problem with a solution (i.e., Bonola’s improvements in non-blocking algorithms (Appellants’ claimed “non-blocking I/O)). Since Appellants’ claim limitation “switching from blocking I/O to non-blocking I/O for the protocol if a number of concurrent communication connections for the protocol is greater than a first threshold” is inherent in Bonola’s teachings of a problem (blocking I/O’s lack of scalability) and its resolution (improved non-blocking I/O algorithms), we decline to find error with the Examiner’s analysis.

Appellants then argue:

Bonola further does not teach . . . “switching from the blocking I/O to the non-blocking I/O if the number of concurrent communication connections is greater than a first threshold,” as recited in claim 1, because Bonola at [0008] merely recites that “multiple requests to a shared resource are governed by an arbitration scheme which grants only one requestor at a time to a shared resource” and because the “multiple requests[”] of Bonola [0008] do not teach or suggest the “blocking I/O” of claim 1, the “non-blocking I/O” of claim 1 or the “number of concurrent communication connections” of claim 1.
As we stated above, Bonola teaches both the claimed “blocking I/O” and “non-blocking I/O” as required by exemplary claim 1. Moreover, the Examiner finds that Bonola’s teachings of “multiple requests” meets Appellants’ claim limitation for a “number of concurrent communication connections.” (Ans. 13, bottom to 14, top.)

Appellants’ argument centers on Bonola’s teachings for blocking I/O at [0008]. That Bonola teaches blocking I/O at [0008] is not the salient question; instead, the issue is whether Bonola contains a teaching that meets Appellants’ claimed “number of concurrent communication connections.” Indeed, Bonola does have this teaching. (See Ans. 12 and Bonola ¶ [0031].) The Examiner finds that Bonola teaches a cache coherency protocol in which multiple software threads are handled simultaneously. (Id.) A cache coherency protocol for handling multiple software threads simultaneously (one variant of non-blocking I/O) is the same as Appellants’ claimed “number of concurrent communication connections.” Thus, we find unpersuasive Appellants’ argument concerning “a bus arbitration scheme [that] grants only one requestor at a time to a shared resource.”

Finally, Appellants argue that Bonola fails to teach the claimed “thread.” (Br. 23, bottom.) More specifically, Appellants argue:

Bonola at [0008] makes no mention of a thread, because a request being denied access to a shared resource is unrelated to “blocking I/O” as recited in claim 1, because a request being denied access to a shared resource is unrelated to “non-blocking I/O” as recited in claim 1, and because Bonola at [0008] describes “multiple requests” and not “the number of concurrent communication connections,” as recited in claim 1. (Id.)
The Examiner finds that the claimed “thread” is taught at paragraph [0031] of Bonola. (Ans. 4, bottom.) Bonola explicitly teaches that examples of cache coherent entities include “software threads.” (See ¶ [0031].) As we stated above, paragraph [0031] of Bonola teaches one of the two variants of non-blocking I/O. Since Bonola’s paragraph [0031] teaches software threads in the context of non-blocking I/O, we find Appellants’ arguments unpersuasive.

Group II: The rejection of claims 6-20 under 35 U.S.C. § 102(b)

Concerning representative claim 6, Bonola fails to teach the claim limitation “means for switching from blocking I/O to non-blocking I/O.” As we stated above, Bonola’s teachings for blocking I/O and two variants of non-blocking I/O do meet Appellants’ claimed “switching from blocking I/O to non-blocking I/O,” a limitation recited in exemplary claim 1. However, 35 U.S.C. § 112, paragraph 6, requires that the claimed “means for switching” occur by the means Appellants articulated in the Specification. (See In re Donaldson, cited above.) As we stated above, the switching inherently taught in Bonola would have been performed by a human user choosing one scheme or the other. Since the Specification requires that switching be performed by “microcode” or “hardware via logic gates,” Bonola’s inherent teaching for switching performed by a user fails to meet Appellants’ claim limitation. (See Spec. 5, ll. 18-20.) We thus find the Examiner erred in rejecting claim 6 since the reference fails to teach
Appellants’ claimed “means for switching” as defined by the Specification and in accordance with 35 U.S.C. § 112, paragraph 6.

Concerning representative claim 11, we find that there is a claim requirement for switching to occur by instructions contained in a signal-bearing medium. (See claim 11 above.) Switching by instructions encoded in a signal-bearing medium is not taught by the Examiner’s cited reference Bonola because, as we stated above, the switching inherently taught by Bonola would have been performed by a human user, and not by instructions on a signal medium capable of executing instructions. Since the Specification requires that switching be performed by “microcode” or “hardware via logic gates and/or other appropriate hardware techniques,” Bonola’s inherent teaching for switching by a user fails to meet Appellants’ claim limitation. (See Spec. 5, ll. 18-20.) We thus find the Examiner erred in rejecting claim 11 since the reference does not teach Appellants’ claimed “switching” in a “signal-bearing medium.”

Claim 16 requires that the instructions for Appellants’ claimed “switching” be encoded in a signal-bearing memory. However, the switching inherently taught in Bonola would have been performed by a human user, and not by a processor executing instructions contained in a signal-bearing memory. Accordingly, we find that the Examiner erred in rejecting claim 16 and its dependencies.
CONCLUSIONS OF LAW

Based on the findings of facts and analysis above, we conclude that the Examiner erred in rejecting claims 6-20. The Examiner’s rejection of claims 1 and 3-5 is Affirmed.

OTHER ISSUES

REJECTION OF CLAIMS 11-15 UNDER 37 C.F.R. § 41.50(B)

We make the following new grounds of rejection using our authority under 37 C.F.R. § 41.50(b).

Rejection:

Exemplary claim 11 recites “a signal-bearing medium encoded with instructions.” (See claim 11.) In the Specification, page 9, lines 15 to 17 Appellants define a signal-bearing medium as including “information conveyed to the computer system 100 by a communications medium, such as through a computer or a telephone network, e.g., the network including wireless communications.” Thus, we find that the signal-bearing medium is a data signal embodied in a carrier frequency wave.

Such a claim for computer instructions embodied only in a signal is not considered to be statutory under 35 U.S.C. § 101.4 The Court of

____________________

4 See, e.g., In re Nuijten, 500 F.3d 1346, 1359 (Fed. Cir. 2007). Ex Parte Hartmann, No. 2006-1607, 2006 WL 2700810, at 4 (B.P.A.I. 2006) (non-precedential). ‘Signals’ are not statutory subject matter. See also “Interim
Appeals for the Federal Circuit has recently confirmed this policy in *In re Nuijten*. “A transitory, propagating signal like Nuijten’s is not a “process, machine, manufacture, or composition of matter.” Those four categories define the explicit scope and reach of subject matter patentable under 35 U.S.C. § 101; thus, such a signal cannot be patentable subject matter.” *In re Nuijten*, 500 F.3d 1346, 1359 (Fed. Cir. 2007).

**DECISION**

The Examiner’s rejection of claims 6-20 is Reversed. The rejection of claims 1 and 3-5 is Affirmed. Claims 11-15 are rejected under 35 U.S.C. § 101.

With respect to the affirmed rejection(s), 37 C.F.R. § 41.52(a)(1) provides that Appellants “may file a single request for rehearing within two months from the date of the original decision of the Board.”

In addition to affirming the Examiner’s rejection(s) of one or more claims, this decision contains a new ground of rejection pursuant to 37 C.F.R. § 41.50(b). 37 C.F.R. § 41.50(b) provides that “[a] new ground of rejection pursuant to this paragraph shall not be considered final for judicial review.”

37 C.F.R. § 41.50(b) also provides that the Appellants, **WITHIN TWO MONTHS FROM THE DATE OF THE DECISION**, must exercise

one of the following two options with respect to the new ground of rejection to avoid termination of the appeal as to the rejected claims:

(1) **Reopen prosecution.** Submit an appropriate amendment of the claims so rejected or new evidence relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the proceeding will be remanded to the examiner. . . .

(2) **Request rehearing.** Request that the proceeding be reheard under § 41.52 by the Board upon the same record. . . .

Should Appellants elect to prosecute further before the Examiner pursuant to 37 C.F.R. § 41.50(b)(1), in order to preserve the right to seek review under 35 U.S.C. §§ 141 or 145 with respect to the affirmed rejection, the effective date of the affirmance is deferred until conclusion of the prosecution before the Examiner unless, as a mere incident to the limited prosecution, the affirmed rejection is overcome.

If Appellants elect prosecution before the Examiner and this does not result in allowance of the application, abandonment or a second appeal, this case should be returned to the Board of Patent Appeals and Interferences for final action on the affirmed rejection, including any timely request for rehearing thereof.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

**AFFIRMED-IN-PART**

37 C.F.R. § 41.50(b)
peb