Paper No. 21

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KIYOSHI SATOH, MASAKAZU SASAKI, HIROKI KITAHORI,
SUNAO NEMOTO, DAVID ALBRECHT, and GREGORY FREES

Appeal No. 1998-3348
Application No. 08/541,948

ON BRIEF

Before HAIRSTON, LALL, and BARRY, Administrative Patent Judges.

BARRY, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the rejection of claims 1-10. We reverse.

BACKGROUND

The invention at issue in this appeal relates to hard disk drives (HDDs). To promote manufacturing efficiency, the computer industry seeks to maximize the number of standard parts shared by different products in a product line. With respect to HDDs, the industry attempts to use the same disk drive enclosure case for an HDD having a single disk and also for an HDD having multiple disks.

Heretofore, the difference in mechanical resonance frequencies of a single-disk HDD and a multiple-disk HDD has impeded the use of a standard enclosure case for both single-disk and multiple-disk HDDs. Because the enclosure case affects the mechanical resonance frequency of an HDD, the enclosure case has only been compatible with one of the two HDDs. Without compatibility between the enclosure case and the HDD, magnetic head stability during track following could not be maintained.

In contrast, the appellants’ invention uses an artificial movement model to derive first and second mechanical resonance frequency values. The first mechanical resonance frequency is associated with the coupling of the pitching mode mechanical resonance frequency of a no-load spindle motor and the primary mechanical resonance frequency of one disk to be loaded. The second mechanical resonance frequency is associated with the coupling of the pitching mode mechanical resonance frequency of the no-load spindle motor and the primary mechanical resonance frequency of a plurality of disks to be loaded. By selecting the spindle motor and disk to minimize the difference between the first mechanical resonance frequency value and the second mechanical resonance frequency value, the actual resonance frequency value of the HDD will be approximately the same for one disk as for multiple disks. Manufacturing efficiency is promoted because a single type of enclosure case is compatible with an HDD no matter whether one or multiple disks are included therein.

Claim 9, which is representative for our purposes, follows:

> 9. A method for preventing instability of track following of a magnetic head using one and the same enclosure case in a product lineup, independent of the number of disks, comprising the steps of:
>
> determining a first mechanical resonance frequency associated with the coupling of the pitching mode mechanical resonance frequency of a no-load spindle motor and the primary mechanical resonance frequency of one disk to be loaded;
>
> determining a second mechanical resonance frequency associated with the coupling of the

pitching mode mechanical resonance frequency of the no-load spindle motor and the primary mechanical resonance frequency of a plurality of disks to be loaded; and

selecting the spindle motor and the disk to minimize the difference in the first mechanical resonance frequency value and the second mechanical resonance frequency value.

The prior art applied in rejecting the claims follows:

Morita 5,479,304 Dec. 26, 1995
(effectively filed Mar. 29, 1993)

Boutaghou et al. (Boutaghou) 5,530,602 June 25, 1996
(filed June 29, 1993)

Morehouse et al. (Morehouse) 5,379,171 Jan. 3, 1995
(filed Sep. 25, 1991).

Claims 1, 3, 4, 8, and 9 stand rejected under 35 U.S.C. § 103(a) as being obvious over Morita in view of Boutaghou. Claims 2, 5-7, and 10 stand rejected under § 103(a) as being obvious over Morita in view of Boutaghou further in view of Morehouse.

Rather than reiterate the arguments of the appellants or examiner in toto, we refer the reader to the briefs and answer for the respective details thereof.

OPINION

In deciding this appeal, we considered the subject matter on appeal and the rejections of the examiner. Furthermore, we duly considered the arguments and evidence of the appellants and examiner. After considering the record, we are persuaded that the examiner erred in rejecting claims 1-10. Accordingly, we reverse.

We begin by noting the following principles from In re Rijckaert, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993).

> In rejecting claims under 35 U.S.C. § 103, the examiner bears the initial burden of presenting a herima facie case of obviousness. In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).... "A prima facie case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art." In re Bell, 991 F.2d 781, 782, 26 USPQ2d 1529, 1531 (Fed. Cir. 1993) (quoting In re Rinehart,

531 F.2d 1048, 1051, 189 USPQ 143, 147 (CCPA 1976)).

With these principles in mind, we consider the examiner's rejection and the appellants' argument.

The examiner makes the following assertions.

> Morita recognizes the importance of determining the resonance in the spindle motor of a disk drive through the use of a simple mechanical model (see Morita, col. 2, lines 1-24). Therefore, one of ordinary skill in the art at the time the invention was made would have found it obvious to use some kind of mechanical model in order to gain resonant frequency data from the spindle motor, just as Morita does. In addition, it is not only known to create resonant models of spindle motors but it is also known that changing the disk thickness, diameter, disk alloy, and clamping force effect the resonant frequency of the spindle motor as taught by Boutaghou et al, col. 5, lines 45-49. Therefore, one of ordinary skill in the art would have had sufficient motivation to model the spindle motor while adjusting various parameters (such as the number of disks used in the disk stack) in the spindle motor in order to arrive at a reasonable frequency.

(Examiner's Answer at 5-6.) The appellants argue, "neither *Morita* nor *Boutaghou* teaches or suggests determining two separate resonance frequencies: one associated with associated with a disk drive having one disk and the other associated with a disk drive having multiple disks. Also, neither *Morita* nor *Boutaghou* teaches or suggests varying the disk drive parameters to minimize the difference between the two frequency values.” (Reply Br. at 2.)

“‘[T]he main purpose of the examination, to which every application is subjected, is to try to make sure that what each claim defines is patentable. [T]he name of the game is the claim ....’” In re Hiniker Co., 150 F.3d 1362, 1369, 47 USPQ2d 1523, 1529 (Fed. Cir. 1998)(quoting Giles S. Rich, The Extent of the Protection and Interpretation of Claims--American Perspectives, 21 Int'l Rev. Indus. Prop. & Copyright L. 497, 499, 501 (1990)). Here, claims 1 and 2 specify in pertinent part the following limitations: "the spindle motor and the disk are selected to minimize the difference in a first mechanical resonance frequency value and a second mechanical resonance frequency value, wherein ... the first mechanical resonance frequency [is] associated with the coupling of the pitching mode mechanical resonance frequency of a no-load spindle motor and the primary mechanical resonance frequency of one disk to be loaded and the second mechanical resonance frequency [is] associated with the coupling of the pitching mode mechanical resonance frequency of the no-load spindle motor and the primary mechanical resonance frequency of a plurality of disks to be loaded, so that the first mechanical resonance frequency and the second mechanical resonance frequency do not differ for one disk loaded and for plural disks loaded." Similarly, claims 3-6 specify in pertinent part the following limitations: "shaft parameters are adjusted based on ... the pitching mode mechanical resonance frequency of a no-load spindle motor and the primary mechanical resonance frequency of the disks loaded has been transformed so that the mechanical resonance frequency determined by coupling the pitching mode mechanical resonance frequency of the disk loading spindle motor with the primary mechanical resonance frequency of disks to be loaded is the same for one disk loaded and for plural disks loaded." Also similarly, claim 7 specifies in pertinent part the following limitations: "said spindle motor includes a cartridge-like subassembly made by previously applying axial opposingly directed preloads to outer and inner rings of a bearing based on ... the pitching mode mechanical resonance frequency of a no-load spindle motor and the primary mechanical resonance frequency of the disks loaded has been transformed so that the mechanical resonance frequency determined by coupling the pitching mode mechanical resonance frequency of the disk loading spindle motor with the primary mechanical resonance frequency of disks to be loaded is the same for one disk loaded and for plural disks loaded." Further similarly, claim 8 specifies in pertinent part the following limitations: "means for adjusting at least one of the diameter of the shaft of a spindle motor, the material of said shaft, the size of a bearing for holding said shaft by clamping, the pressure applied to said bearing, the span over the bearing, the thickness of the disks, the material of the disks, disk clamping position, and the disk clamping force based on ... the pitching mode mechanical resonance frequency of a no-load spindle motor and the primary mechanical resonance frequency of the disks loaded has been transformed so that the mechanical resonance frequency determined by coupling the pitching mode mechanical resonance frequency of the disk loading spindle motor with the primary mechanical resonance frequency of disks to be loaded is the same for one disk loaded and for plural disks loaded." Similarly, claims 9 and 10 specify in pertinent part the following limitations: "determining a first mechanical resonance frequency associated with the coupling of the pitching mode mechanical resonance frequency of a no-load spindle motor and the primary mechanical resonance frequency of one disk to be loaded; determining a second mechanical resonance frequency associated with the coupling of the pitching mode mechanical resonance frequency of the no-load spindle motor and the primary mechanical resonance frequency of a plurality of disks to be loaded; and selecting the spindle motor and the disk to minimize the difference in the first mechanical resonance frequency value and the second mechanical resonance frequency value." Accordingly, claims 1-10 require minimizing the difference between a first mechanical resonance frequency associated with the coupling of the pitching mode mechanical resonance frequency of a no-load spindle motor and the primary mechanical resonance frequency of one disk to be loaded and a second mechanical resonance frequency associated with the coupling of the pitching mode mechanical resonance frequency of the no-load spindle motor and the primary mechanical resonance frequency of plural disks to be loaded.

The examiner fails to show a teaching or suggestion of the limitations in the prior art of record. “Obviousness may not be established using hindsight or in view of the teachings or suggestions of the inventor.” Para-Ordnance Mfg. v. SGS Importers Int’l, 73 F.3d 1085, 1087, 37 USPQ2d 1237, 1239 (Fed. Cir. 1995) (citing W.L. Gore & Assocs., Inc. v. Garlock, Inc., 721 F.2d 1540, 1551, 1553, 220 USPQ 303, 311, 312-13 (Fed. Cir. 1983)). “It is impermissible to use the claimed invention as an instruction manual or ‘template’ to piece together the teachings of the prior art so that the claimed invention is rendered obvious.” In re Fritch, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1784 (Fed. Cir. 1992) (citing In re Gorman, 933 F.2d 982, 987, 18 USPQ2d 1885, 1888 (Fed. Cir. 1991)). “The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification.” Id. at 1266, 23 USPQ2d at 1784 (citing In re Gordon, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984)).

Here, neither Morita nor Boutaghou, alone or in combination, would have suggested modeling, let alone minimizing the difference between, a first mechanical resonance frequency associated with the coupling of the pitching mode mechanical resonance frequency of a no-load spindle motor and the primary mechanical resonance frequency of one disk to be loaded and a second mechanical resonance frequency associated with the coupling of the pitching mode mechanical resonance frequency of the no-load spindle motor and the primary mechanical resonance frequency of plural disks to be loaded. The portion of Morita on which the examiner relies merely recognizes a relationship between the resonance frequency of an HDD, the mass of the HDD, and the rigidity of some of its components. Specifically, “to increase the resonance frequency, it is necessary to reduce the mass m or increase the hub rigidity k1, bearing rigidity k2 or bracket rigidity k3.” Col. 2, ll. 13-15. The part of Boutaghou on which he relies, in turn, merely mentions that variations in certain parameters of a HDD cause variations in the resonant frequency of its modes. Specifically, “[v]ariations in disk thickness, disk diameters, disk alloy and clamping force all affect the resonant frequencies.” Col. 5, ll. 46-48. Relying on Morehouse only to teach “that preloaded bearing cartridges are old and well known[,]” (Examiner's Answer at 4), the examiner fails to allege, let alone show, that the reference cures the deficiency of Morita and Boutaghou.

Because Morita merely recognizes a relationship between the resonance frequency of an HDD, the mass of the HDD, and the rigidity of some of its components, and Boutaghou merely mentions that variations in certain parameters of an HDD cause variations in the resonant frequency of an HDD, we are not persuaded that the teachings from the prior art would appear to have suggested the limitations of "the spindle motor and the disk are selected to minimize the difference in a first mechanical resonance frequency value and a second mechanical resonance frequency value, wherein ... the first mechanical resonance frequency [is] associated with the coupling of the pitching mode mechanical resonance frequency of a no-load spindle motor and the primary mechanical resonance frequency of one disk to be loaded and the second mechanical resonance frequency [is] associated with the coupling of the pitching mode mechanical resonance frequency of the no-load spindle motor and the primary mechanical resonance frequency of a plurality of disks to be loaded, so that the first mechanical resonance frequency and the second mechanical resonance frequency do not differ for one disk loaded and for plural disks loaded;]" "shaft parameters are adjusted based on ... the pitching mode mechanical resonance frequency of a no-load spindle motor and the primary mechanical resonance frequency of the disks loaded has been transformed so that the mechanical resonance frequency determined by coupling the pitching mode mechanical resonance frequency of the disk loading spindle motor with the primary mechanical resonance frequency of disks to be loaded is the same for one disk loaded and for plural disks loaded[;]" "said spindle motor includes a cartridge-like subassembly made by previously applying axial opposingly directed preloads to outer and inner rings of a bearing based on ... the pitching mode mechanical resonance frequency of a no-load spindle motor and the primary mechanical resonance frequency of the disks loaded has been transformed so that the mechanical resonance frequency determined by coupling the pitching mode mechanical resonance frequency of the disk loading spindle motor with the primary mechanical resonance frequency of disks to be loaded is the same for one disk loaded and for plural disks loaded[;]" "means for adjusting at least one of the diameter of the shaft of a spindle motor, the material of said shaft, the size of a bearing for holding said shaft by clamping, the pressure applied to said bearing, the span over the bearing, the thickness of the disks, the material of the disks, disk clamping position, and the disk clamping force based on ... the pitching mode mechanical resonance frequency of a no-load spindle motor and the primary mechanical resonance frequency of the disks loaded has been transformed so that the mechanical resonance frequency determined by coupling the pitching mode mechanical resonance frequency of the disk loading spindle motor with the primary mechanical resonance frequency of disks to be loaded is the same for one disk loaded and for plural disks loaded[;]" or "determining a first mechanical resonance frequency associated with the coupling of the pitching mode mechanical resonance frequency of a no-load spindle motor and the primary mechanical resonance frequency of one disk to be loaded; determining a second mechanical resonance frequency associated with the coupling of the pitching mode mechanical resonance frequency of the no-load spindle motor and the primary mechanical resonance frequency of a plurality of disks to be loaded; and selecting the spindle motor and the disk to minimize the difference in the first mechanical resonance frequency value and the second mechanical resonance frequency value." Therefore, we reverse the rejection of claims 1, 3, 4, 8, and 9 as being obvious over Morita in view of Boutaghou and of claims 2, 5-7, and 10 as being obvious over Morita in view of Boutaghou further in view of Morehouse.

CONCLUSION

In summary, the rejection of claims 1-10 under § 103(a) is reversed.

REVERSED

KENNETH W. HAIRSTON Administrative Patent Judge	
PARSHOTAM S. LALL Administrative Patent Judge	BOARD OF PATENT APPEALS AND INTERFERENCES
LANCE LEONARD BARRY Administrative Patent Judge	

LLB/gjh

DAVID W. LYNCH
ALTERA LAW GROUP, LLC
6500 CITY WEST PARKWAY
SUITE 100
MINNEAPOLIS, MN 55344-7701

Once signed, forward to Team 3 for mailing.

APPEAL NO. 1998-3348 - JUDGE BARRY
APPLICATION NO. 08/541,948

APJ BARRY - **2 copies**

APJ HAIRSTON

APJ LALL

Prepared By: APJ BARRY

DRAFT SUBMITTED: 12 Feb 02

FINAL TYPED:

Team 3:

I typed all or almost all of this opinion.

Please check spelling, cites, and quotes.

Do NOT change matters of form or style.

For any additional reference provided, please prepare PTO 892 and include copy of references