The opinion in support of the decision being entered today was _not_ written for publication and is _not_ binding precedent of the Board.

Paper No. 17

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KEITH R. BERDING
and KENNETH F. YOUNG

Appeal No. 1999-2399
Application 08/705,798[1]

ON BRIEF

Before KRASS, JERRY SMITH, 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, 2, and 4-19. Claim 3 is

[1] Application for patent filed August 30, 1996, entitled "Head Suspension Having Reduced Torsional Vibration."

canceled. Claims 20-26 have been withdrawn pursuant to a restriction requirement.

We reverse.

BACKGROUND

The disclosed invention relates to a transducer suspension for a storage drive system which is bendable in a vertical direction for holding the transducer adjacent to the media, but is torsionally stiff about a longitudinal axis for quicker access times and reduced noise and errors. A brace is used to provide torsional stiffness.

Claim 1 is reproduced below.

> 1. A suspension for an information storage system head, comprising:
>
> a beam extending generally in a longitudinal direction from a mounting end to a transducer end and extending further in a lateral direction than in a direction perpendicular to said lateral and longitudinal directions, said mounting end being held relatively fixed in said perpendicular direction with at least said transducer end being actuable in at least one of said lateral and longitudinal directions, said beam defining a laterally extensive region of perpendicular flexibility with laterally opposed sections of said region being attached to a torsionally stiff brace extending much further in said lateral direction than a longitudinal extent of said attachment to said sections, with said brace longitudinally dividing said region of perpendicular flexibility, wherein said beam has a flexibility in moving said transducer end relative to said mounting end which is substantially greater in said

perpendicular direction than in said lateral and longitudinal directions and has a preferentially increased torsional stiffness about a longitudinal axis compared to a bending stiffness in said perpendicular direction.

The Examiner relies on the following references:

U.S. Patent

Kohso et al. (Kohso)	5,313,353	May 17, 1994

Japanese Laid Open (Kokai) Patent Applications

Kikuchi et al. (Kikuchi[2])	59-213066	December 1, 1984
Aoyanagi[3]	4-181575	June 29, 1992

Claims 1, 2, 7-9, 11-13, and 18 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Kikuchi.

Claims 1, 2, 5, 7, 9, 10, 12, 16, and 19 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Aoyanagi.

Claims 1, 2, 9, 11-14, 18, and 19 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Kohso.

Claims 4, 6, 15, and 17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Aoyanagi.

We refer to the final rejection (Paper No. 8) (pages referred to as "FR__") and the examiner's answer (Paper

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[2] A translation was provided by Appellants' "Information Disclosure Statement per 37 C.F.R. §1.98" (part Paper No. 9) filed September 24, 1998, and resubmitted in the "Supplemental Information Disclosure Statement per 37 C.F.R. §1.98" (Paper No. 12), filed October 26, 1998.

[3] A translation of Aoyanagi has been prepared by the U.S. Patent and Trademark Office and a copy accompanies this opinion.

No. 16) (pages referred to as "EA__") for a statement of the Examiner's position, and to the brief (Paper No. 15) (pages referred to as "Br__") for a statement of Appellants' arguments thereagainst.

OPINION

35 U.S.C. § 102(b) over Kikuchi

Claims 1, 2, 7-9, and 11

Appellants argue that elements 12a in Kikuchi are "low rigidity parts" and cannot be characterized as "torsionally stiff braces" as found by the Examiner. It is argued that "claim 1 not only defines a torsionally stiff brace, but that the beam that the torsionally stiff brace is attached to has 'a preferentially increased torsional stiffness about a longitudinal axis of the beam compared to a bending stiffness in the perpendicular direction'" (Br6). It is argued that torsional motion will cause one end of low rigidity section 12a to open slightly and the other end of 12a to close slightly; thus, Kikuchi actually has a reduced torsional stiffness due to sections 12a (Br6-7). It is argued that while lateral bending of the low rigidity part 12a is difficult, twisting about a long axis is not, and the parts

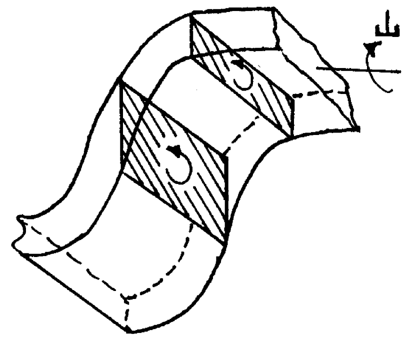
12a do not reduce the torsional flexibility of the beam (Br7-8).

The Examiner finds that "[t]he second purpose of brace 12a [in Kikuchi] is to reduce or prevent beam 12 from being torsionally flexible, e.g. twisting or turning" (EA8) because otherwise the transducer 11 would not fly properly.

We find nothing in Kikuchi to support this finding.

The Examiner further finds that since "braces 12a cannot bend up or down as easily along a lateral direction, they are torsionally stiff as required by the claims" (EA9).

We agree with the Examiner's conclusion, if not his reasoning. The structural analysis of torsion is difficult with anything other than cylindrical and cylindrical shell members symmetrically located with respect to the torsional axis. Nevertheless, for empirical reasons, we find that the bent sections 12a inherently provide increased torsional stiffness. The torsional stiffness around the longitudinal axis is related to the cross-sectional area of the beam in the transverse plane which resists the twisting. Consider two cross-sectional areas: one through the flat portion of beam 12 and one through the bent portion 12a as shown below.



Since the cross-sectional area on the bent portion 12a is greater than the cross-sectional area through the flat portion, it will undergo less deformation for the same amount of torsion. Thus, the bent section 12a has increased torsional stiffness. Kikuchi's description of sections 12a as "low rigidity sections" means that the sections have low rigidity to bending of the end of the beam in a perpendicular direction, not that they have low rigidity in all bending or twisting directions.

Appellants argue that Kikuchi does not teach "said beam defining a laterally extensive region of perpendicular flexibility with laterally opposed sections of said region being attached to a torsionally stiff brace . . ., with said brace longitudinally dividing said region of perpendicular flexibility" because the low rigidity sections 12a in Kikuchi are connected to high rigidity sections, thus teaching away from a brace that joins flexible sections (Br8).

The Examiner finds that beam 12 defines a laterally extensive region of perpendicular flexibility with laterally opposed sections being attached to torsionally stiff braces 12a (FR2; EA4) and (EA9): "The region of perpendicular flexibility is the regions of beam 12 not encompassed by braces 12a."

We are not persuaded by the Examiner's reasoning. The embodiment of figure 9 is expected to have the same action and effect as the embodiment of figure 5. Elements 12a are low rigidity sections and the flat plate sections of supporting plate 12 are high rigidity sections. The high rigidity flat plate sections of 12 do not bend and, therefore, are not a "laterally extensive region of perpendicular flexibility," as found by the Examiner. Low rigidity section 12a allows the plate 12 to readily bend in a perpendicular direction and is "a laterally extensive region of perpendicular flexibility." However, it is not reasonable to consider section 12a both "a laterally extensive region of perpendicular flexibility" and "a torsionally stiff brace" because the brace is claimed as "attached" to the region of perpendicular flexibility. Furthermore, claim 1 recites "said brace longitudinally dividing said region of perpendicular flexibility" and section 12a, which is itself a region of perpendicular flexibility, does not divide a region of perpendicular flexibility. For these reasons, the Examiner erred in finding claim 1 to be anticipated. The anticipation rejection of claims 1, 2, 7-9, and 11 is reversed.

<u>Claims 12, 13, and 18</u>

For the reasons stated in connection with claim 1, we find that the low rigidity sections 12a in Kikuchi "provides an increased torsional stiffness about said X direction," as recited in claim 12.

Appellants argue that Kikuchi does not teach "said beam being flexible in a plurality of sections that are spaced apart in said X and Y directions and joined by a brace extending in said Y direction," as recited in claim 12.

The Examiner does not address this argument.

Kikuchi clearly does not disclose a "plurality of sections that are spaced apart" in a Y direction like the spaced apart strips 48 and 50 spaced apart by opening 46 in Appellants' figure 1, much less sections spaced apart in a Y direction joined by a brace. Accordingly, the Examiner erred in finding claim 12 to be anticipated. The anticipation rejection of claims 12, 13, and 18 over Kikuchi is reversed.

35 U.S.C. § 102(b) over Aoyanagi

Claims 1, 2, 5, 7, 9, and 10

The Examiner finds that "Figure 1 [of Aoyanagi] also shows beam 2a defining a laterally extensive region of perpendicular flexibility with laterally opposed sections of the extensive region being attached to torsionally stiff brace(s) 4 . . . which longitudinally divide the region of perpendicular flexibility" (FR3; EA5). The Examiner states that "[i]t is a curious situation as to why applicants state that the opening (void) of Aoyanagi is not a laterally extensive region of perpendicular flexibility when figure 1 of the instant application shows opening 46 which defines the laterally extensive region of perpendicular flexibility as defined by applicants' specification" (FR8). The Examiner further states that "not unlike appellants['] claimed and disclosed invention, Aoyanagi torsionally supports the flexible spring 2a by way of reinforcement plates or torsionally stiff braces to enable a vibration-proof property of spring 2a" (EA9-10).

Appellants argue that a void has no solid matter, and thus cannot have flexibility (Br11). It is argued that the opening can increase the perpendicular flexibility of a hinge region, such as 66 in figure 3, but would not create a perpendicularly flexible region if formed in the area between vertical flanges 40 and 42 in figure 1 (Br11). It is argued that because of the reinforcement plate 4, "Aoyanagi does not have a laterally extensive region of perpendicular flexibility divided by a brace as defined in claim 1" (Br12).

We agree with Appellants' arguments and find the Examiner's findings and reasons unpersuasive. Aoyanagi teaches a "press bending part (9) of said press spring (2a)" (translation, p. 3), which we find is "said beam defining a laterally extensive region of perpendicular flexibility." The "[r]einforcement plate (4) . . . is provided at the areas except press bending part (9) of said press spring (2a)" (translation, p. 3). The press spring 2a/reinforcement plate 4 assembly in figure 1 of Aoyanagi is clearly intended to bend only at the press bending part 9. The area of press spring 2a covered by the reinforcement plate 4 is designed to be inflexible because it reinforces and prevents resonance of the press spring 2a. The edges of the plate 4 act like flanges 40 and 42 in Appellants' figure 1 to prevent perpendicular flexibility; for this reason, the Examiner erred in finding that the portion of press spring 2a covered by reinforcement plate 4 includes a region of perpendicular flexibility. Since plate 4 comes up to the press bending portion 9 at the opposed edges, and is considered torsionally stiff because it is intended to prevent tilt (translation, p. 2), Aoyanagi shows "laterally opposed sections of said region [of perpendicular flexibility] being attached to a torsionally stiff brace." However, Aoyanagi does not disclose "said brace longitudinally dividing said region of perpendicular flexibility," as recited in claim 1, because the brace is only on one side of the press bending portion 9. Therefore, the Examiner erred in finding claim 1 to be anticipated and we find no other way the rejection can be sustained. The anticipation rejection of claims 1, 2, 5, 7, 9, and 10 over Aoyanagi is reversed.

Claims 12, 16, and 19

Appellants argue that Aoyanagi does not teach "said beam being flexible in a plurality of sections that are spaced apart in said X and Y directions and joined by a brace extending in said Y direction," as recited in claim 12.

The Examiner does not address this argument.

Aoyanagi discloses a press bending portion 9 which extends across the width of the press spring 2a. Thus, Aoyanagi does not teach a plurality of flexible sections spaced apart in the Y direction and joined by a brace. The Examiner erred in finding claim 12 to be anticipated. The anticipation rejection of claims 12, 16, and 19 over Aoyanagi is reversed.

35 U.S.C. § 102(b) over Kohso

Claims 1, 2, 9, and 11

The Examiner finds that beam 3 in figure 5 defines a laterally extensive region of perpendicular flexibility with laterally opposed sections attached to torsionally stiff braces 3-1B and 3-2B and that braces 3-1B and 3-2B longitudinally divide the region of perpendicular flexibility (FR4; EA6).

Appellants agree with the Examiner that the strips disposed on opposite sides of opening 3-2A in Kohso form a laterally extensive region of perpendicular flexibility, but argue that Kohso does not teach a brace that longitudinally divides those regions, as defined in claim 1 (Br14). It is argued that rib portions 3-1B and 3-2B are disposed at longitudinal ends of the strips rather than longitudinally dividing those strips and that the outer flanges that extend longitudinally up to and beyond rib portions 3-1B and 3-2B are not laterally extensive regions of perpendicular flexibility (Br14).

The Examiner asserts that "figure 5 of Kohso et al[.] shows torsionally stiff braces 3-1B and 3-2B longitudinally dividing those regions [of perpendicular flexibility]" (EA10), without addressing Appellants' arguments. The Examiner says that Appellant seems to suggest that the brace spans the opening, but that the claims lack this limitation (EA10).

The load beam plate spring portion 3-2' in figure 5, consisting of the two longitudinal strips on either side of the opening 3-2A, defines a "laterally extensive region of perpendicular flexibility," like the laterally spaced strips 48 and 50 in Appellants' figure 1. The load beam support portion 3-1' having the upturned flanges along the edges does not define a "laterally extensive region of perpendicular flexibility" because the flanges are intended to prevent perpendicular flexibility like the flanges 40 and 42 in Appellants' figure 1. Because the rib portions 3-1B and 3-2B are not within the region of perpendicular flexibility they do constitute a brace, "said brace longitudinally dividing said region of perpendicular flexibility," as claimed. For a brace to longitudinally divide the region of perpendicular flexibility, the load beam plate spring portion 3-2', it would have to extend across the opening 3-2A to attach to the two strips. The Examiner erred in finding anticipation. The anticipation rejection of claims 1, 2, 9, and 11 is reversed.

<u>Claims 12-14, 18, and 19</u>

Appellants argue (Br14-15):

> Kohso et al. do not teach regions of perpendicular flexibility that are spaced apart in both X and Y directions. While the strips of Kohso et al. are spaced apart in what may be termed the Y direction, no X direction spacing is apparent. Moreover, no brace is shown in that reference joining such regions of perpendicular flexibility that are spaced apart in both X and Y directions. The torsionally stiff brace defined in claim 12 would have less ability to reduce longitudinal torsional vibration of the beam, if it were not joined to regions of perpendicular flexibility spaced apart in both X and Y directions as shown in Kohso et al.

The Examiner does not address these arguments.

In the limitation of "said beam being flexible in a plurality of sections that are spaced apart in said X and Y directions and joined by a brace extending in said Y direction" we interpret "spaced apart in said X . . . direction" to mean that a brace separates flexible sections along the X direction; e.g., laterally spaced strip 48 in Appellants' figure 1 is divided into two sections spaced apart in the X direction by brace 53 and the laterally spaced strip 160 in Appellants' figure 8 is divided into several sections spaced apart in the X direction by braces 166. Kohso has a pair of strips spaced apart in the Y direction, but the strips are not spaced apart in the X direction because a brace would be required. Thus, the Examiner erred in finding anticipation. The anticipation rejection of claims 12-14, 18, and 19 is reversed.

35 U.S.C. § 103(a) over Aoyanagi

The obviousness rejection of claims 4, 6, 15, and 17 does not cure the deficiencies of the anticipation rejection of claims 1 and 12 over Aoyanagi. The obviousness rejection of claims 4, 6, 15, and 17 is reversed.

CONCLUSION

The rejections of claims 1, 2, and 4-19 are reversed.

REVERSED

ERROL A. KRASS)
Administrative Patent Judge)
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) BOARD OF PATENT
JERRY SMITH) APPEALS
Administrative Patent Judge) AND

	)	INTERFERENCES
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