

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. 26

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte YUKIO MIYA, OSAMU SUGIYAMA, RYOTA KOIKE,
TASKASHI TOIDA, SOSAKU KIMURA and KUNIHICO KOKUBO

Appeal No. 2002-0912
Application No. 08/913,187

ON BRIEF

Before COHEN, ABRAMS, and STAAB, Administrative Patent Judges.
ABRAMS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 1 and 3-9. Claims 10-33 have been withdrawn from consideration as being directed to a non-elected invention, and claim 2 has been canceled.

We AFFIRM.

BACKGROUND

The appellants' invention relates to a guide bush for holding a workpiece rotatably and axially slidable on an automatic lathe. An understanding of the invention can be derived from a reading of exemplary claim 1, which has been reproduced below.

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

Toshimitsu <u>et al.</u> (Toshimitsu)	5,366,298	Nov. 22, 1994
Okada <u>et al.</u> (Okada)	5,455,081	Oct. 3, 1995
Japanese Patent Publication (Yoshino) 06060404		May 28, 1987 ¹
Japanese Patent Publication (Yamada) 4-141303		May 14, 1992 ¹

Claims 1, 4 and 5 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamada in view of Toshimitsu.

Claims 3 and 6 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamada in view of Toshimitsu and Yoshino.

Claim 7 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamada in view of Toshimitsu and Okada.

Claims 8 and 9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamada in view of Toshimitsu, Okada and Yoshino.

¹Our understanding of this foreign language reference was obtained from a PTO translation, a copy of which is enclosed.

Rather than reiterate the conflicting viewpoints advanced by the examiner and the appellants regarding the above-noted rejections, we make reference to the Answer (Paper No. 23) and the final rejection (Paper No. 18) for the examiner's complete reasoning in support of the rejections, and to the Brief (Paper No. 22) for the appellants' arguments thereagainst.

OPINION

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

All of the rejections are under 35 U.S.C. § 103(a). The initial burden of establishing a basis for denying patentability to a claimed invention rests upon the examiner. See In re Piasecki 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984). The question under 35 U.S.C. §103 is not merely what the references expressly teach but what they would have suggested to one of ordinary skill in the art at the time the invention was made. See Merck & Co. v. Biotech Labs., Inc. 874 F.2d 804, 807, 10 USPQ2d 1843, 1846 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989) and In re Keller, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981). While there must be some suggestion or motivation for one of ordinary skill in the art to combine the teachings of references, it is not necessary that such be found within the four corners of the

references themselves; a conclusion of obviousness may be made from common knowledge and common sense of the person of ordinary skill in the art without any specific hint or suggestion in a particular reference. See In re Bozak, 416 F.2d 1385, 1390, 163 USPQ 545, 549 (CCPA 1969). Further, in an obviousness assessment, skill is presumed on the part of the artisan, rather than the lack thereof. In re Sovish, 769 F.2d 738, 743, 226 USPQ 771, 774 (Fed. Cir. 1985). Insofar as the references themselves are concerned, we are bound to consider the disclosure of each for what it fairly teaches one of ordinary skill in the art, including not only the specific teachings, but also the inferences which one of ordinary skill in the art would reasonably have been expected to draw therefrom. See In re Boe, 355 F.2d 961, 965, 148 USPQ 507, 510 (CCPA 1966) and In re Preda, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968).

Claim 1 reads as follows:

1. A guide bush for holding a workpiece rotatably and axially slidable on an automatic lathe at a position near a cutting tool, having an inner surface to be in sliding contact with the workpiece coated with a hard carbon film, the hard carbon film being formed on an intermediate layer formed on the inner surface to enhance the adhesion of the hard carbon film on the inner surface.

The examiner is of the view that all of the subject matter recited in claim 1 is disclosed by Yamada, except that Yamada utilizes hard metal inserts on the inner surface for holding a workpiece instead of the hard carbon film formed on an intermediate layer on the inner surface, as recited in the claim. However, the examiner is of the opinion that

Toshimitsu teaches utilizing a hard carbon film formed on an intermediate layer in a bearing structure, and it would have been obvious to one of ordinary skill in the art to so modify the Yamada apparatus (Paper No. 18, pages 2 and 3). The essence of the arguments made by the appellants in rebuttal is that neither reference suggests that a hard carbon film be formed on the inner surface of a guide bush, and that such provides unexpected advantages (Brief, pages 11 and 12).

Yamada, which the examiner applied as the primary reference, was described by the appellants on pages 1 and 2 of their specification in the context of a guide bush over which their invention is an improvement. Yamada discloses a guide bush in which the inner surface is provided with a liner made of heat-resistant and wear resistant material, such as a super-hard alloy or a ceramic (translation, page 5, lines 3-6). The reference goes on to point out that if excessive heat is developed in the guide bush during operation, it becomes burned and the bar (workpiece) moving therein no longer rotates properly, which can result in the guide bush being damaged (translation, page 5, lines 20-22). Yamada solves this problem by providing the inner surface of the guide bush liner, which is in sliding contact with the workpiece, with a plurality of slits through which lubricating oil is caused to flow between the liner and the workpiece. This lessens the friction by lubricating the opposed surfaces, reduces heat, and clears away shavings (translation, pages 6 and 7; Figures 4a and 4b). With regard to the appellants' claim 1, Yamada fails to disclose or teach that the inner surface that is in

sliding contact with the workpiece be “coated with a hard carbon film . . . formed on an intermediate layer formed on the inner surface to enhance the adhesion of the hard carbon film to the inner surface.”

Toshimitsu is directed to a hydrodynamic bearing for spindle and drum motors in data storage devices. The reference states that in order to provide high resistance to wear, the sliding surfaces of these bearings are made of metallic material coated with a film of ceramic material such as silicon carbide, silicon nitride, alumina and the like. A thin film of liquid lubricant can be interposed between the sliding surfaces, by means of a plurality of grooves in the sliding surface. See columns 1 and 2. To improve the coefficient of friction of these bearings, Toshimitsu teaches coating the sliding surface with a uniform hydrogenated amorphous film (column 8, lines 35-40), which is the same material disclosed by the appellants as the “hard carbon film” recited in their claims (specification, page 2). Toshimitsu explains that if the sliding surfaces are made of a ceramic material there is good adherence between the sliding surface and the hydrogenated amorphous film deposited thereon, but

[i]f the sliding surfaces are made of a metallic material, its coefficient of linear expansion is widely different from that of the hydrogenated amorphous carbon film. Therefore, cracks may produce in the hydrogenated amorphous carbon film due to residual internal stresses developed due to an increase in the temperature rise of the sliding surfaces during the deposition of the hydrogenated amorphous carbon film. To avoid such a defect, the sliding surfaces may be coated with the ceramic material, referred to above, and then a hydrogenated amorphous carbon film may be deposited on the coated sliding surfaces. In this

manner, the hydrogenated amorphous carbon film well adheres to the sliding surfaces” (column 13, lines 2-15, emphasis added).

Thus, Toshimitsu teaches that the anti-friction characteristics of a bearing having a metal sliding surface are improved by coating the metallic surface with a hydrogenated amorphous film, and that the adherence of this film to the metallic surface is enhanced by forming it upon an intermediate layer of ceramic material.

It therefore is our view that one of ordinary skill in the art would have found it obvious to modify the Yamada guide bush by providing the metallic inner surface with a coating of hard carbon film formed on an intermediate layer of ceramic material which has been formed on the metallic inner surface. Explicit suggestion for this modification is found in Toshimitsu's teaching that this improves the adherence of the hard carbon film to the metallic inner surface. This being the case, the combined teachings of Yamada and Toshimitsu establish a prima facie case of obviousness with regard to the subject matter recited in claim 1, and we will sustain the rejection. Claims 4 and 5 also stand rejected on the basis of Yamada and Toshimitsu, and since the appellants have elected to group them with claim 1 (Brief, page 10), the rejection of these claims also is sustained.

In the course of arriving at this conclusion, we carefully considered the appellants' arguments. As we stated above, explicit suggestion exists for making the modification to Yamada proposed by the examiner. Once having been modified, the advantages that accrue to the Yamada guide bush are the same as those attributed to

their invention by the appellants. Thus, the appellants' arguments to the contrary are not persuasive.

Claim 3 adds to claim 1, and claim 6 to claim 5, the requirement that the intermediate layer comprise a lower layer of titanium, chromium or a compound containing titanium or chromium, and an upper layer of silicon, germanium or a compound containing silicon or germanium. The examiner has rejected claims 3 and 6 as being unpatentable over Yamada and Toshimitsu, taken further with Yoshino, which was cited for its teaching of forming intermediate layers as recited in the claim to support hard carbon films. The first argument presented by the appellants with regard to this matter is that Yoshino doesn't supply the deficiencies present in Yamada and Toshimitsu. Since we found no such deficiencies to exist, and have sustained the rejection of claims 1 and 5, this argument is not persuasive. The second argument is that the combination of references does not suggest using the two-layer film set forth in claims 3 and 6 in the guide bush of a lathe. As to this, we first point out that the obviousness of providing an intermediate layer to promote adhesion of the hard carbon film to the metal inner surface already was established above with regard to claim 1. Yoshino explains that hard carbon films deposited on metallic members can peel off easily (translation, page 3), and teaches solving this problem by utilizing a two-layer film having one layer of Cr or Ti and another of Si or Ge between the hard carbon film and the metallic layer. According to Yoshino, this will "dramatically improve the adhesion"

between the film and the metal (translation, page 4). In our view, Yoshino thus would have suggested to one of ordinary skill in the art the advantage of further modifying the Yamada guide bush in the manner set forth in claims 3 and 6. The rejection of claims 3 and 6 therefore is sustained.

Independent claim 7 stands rejected as being unpatentable over Yamada and Toshimitsu, applied as against claim 1, taken further with Okada. It is the examiner's position that it would have been obvious to one of ordinary skill in the art to carburize the inner surface of the Yamada guide bush, as modified by Toshimitsu, prior to applying the hydrogenated amorphous layer, in order to promote adhesion. The appellants agree with the examiner that Okada teaches forming a hard carbon surface on iron type materials by carbonization (Brief, page 14). However, they argue that the rejection is improper because Okada does not overcome the deficiencies of the first two references, and provides no teaching of using carburization for forming a hard carbon film on the surface of a guide bush for a lathe. As to the first argument, we have decided above that there are no deficiencies in combining Yamada and Toshimitsu. As to the second, Okada is applied only for its teaching of forming a carburized layer on a metallic surface in order to promote adhesion, which in our view would have provided sufficient suggestion to one of ordinary skill in the art to apply the technique to metal objects in which the problem of adhesion of films exists, including guide bushes. The rejection of independent claim 7 is sustained.

Claim 8 adds to independent claim 7 the requirement that there be an intermediate layer for enhancing adhesion interposed between the carburized layer and the hard carbon film, and claim 9 that the intermediate layer have an upper layer and a lower layer. In rejecting claims 8 and 9, the examiner has added Yoshino to the references applied against claim 7, on the basis that Yoshino teaches it is well known in the art to provide such an intermediate layer. The response by the appellants is only that these references are deficient for the same reasons as previously were presented with regard to the other rejections. Claim 1 sets forth the intermediate layer presented in claim 8, and we agreed with the examiner in sustaining that rejection that the interposition of an intermediate layer to enhance adhesion between the inner surface of the guide bush and the hard carbon film placed thereon would have been obvious. Claim 3 included the two-layer intermediate layer presented in claim 9, and we also sustained the rejection of that claim. For the same reasons as were set forth in those cases, we will sustain the rejection of claims 8 and 9.

CONCLUSION

All of the rejections are sustained.

The decision of the examiner is affirmed.

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

AFFIRMED

IRWIN CHARLES COHEN
Administrative Patent Judge

NEAL E. ABRAMS
Administrative Patent Judge

LAWRENCE J. STAAB
Administrative Patent Judge

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