

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte OON-PIN LIM, CHENG-EE OO,
JOKHAIRI YUSOFF,
and KIN-MUN LO

Appeal 2008-4007
Application 11/061,707
Technology Center 1700

Decided: October 21, 2008

Before BRADLEY R. GARRIS, MICHAEL P. COLAIANNI, and
JEFFREY B. ROBERTSON, *Administrative Patent Judges*.

ROBERTSON, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134(a) (2002) from the
Examiner's final rejection of pending claims 1-6. (Examiner's Answer

entered February 11, 2008, hereinafter “Ans.”).¹ We have jurisdiction pursuant to 35 U.S.C. § 6(b) (2002).

We REVERSE and ENTER NEW GROUNDS OF REJECTION under 37 C.F.R. § 41.50(b)(2007).

Appellants’ claimed invention is directed to a bonding tool for bonding a ribbon to a bonding pad. The bonding tool includes a bond foot having a plurality of protrusions extending therefrom in order to press the ribbon against the bonding pad. The protrusions have a height greater than 40 percent of the ribbon thickness. The bonding tool also includes a transducer that causes the bond foot to move in a predetermined pattern with respect to the bond pad. (Spec. 2, ll. 20-27).

Claims 1-6 recite:

1. A bonding tool for bonding a ribbon characterized by a thickness, to a bonding pad, said bonding tool comprising:

a bond foot having a plurality of protrusions extending therefrom for pressing said ribbon against said bonding pad, said protrusions having a height greater than 40 percent of said ribbon thickness;

a transducer for causing said bond foot to move in a predetermined pattern with respect to said bond pad while said bond foot is pressed against said ribbon.

¹ We do not address Appellants’ comments regarding the timeliness of the Examiner’s Final Rejection as such a challenge is not grounds for appeal, but was reviewable during prosecution by Petition under 37 C.F.R. § 1.181. See MPEP §§ 706.07(c), 1002.02(c). (Appeal Brief filed Oct. 15, 2007, hereinafter “Br.,” 1).

2. The bonding tool of Claim 1 wherein said height of said protrusions is between 40 and 80 percent of said thickness of said ribbon.
3. The bonding tool of Claim 1 wherein said protrusions have a rectangular cross-section.
4. The bonding tool of Claim 3, wherein said protrusions comprise truncated pyramids having a top surface parallel to a surface of said ribbon, said protrusions all having the same height.
5. The bonding tool of Claim 3, wherein said transducer causes said bond foot to move back and forth in a predetermined direction and wherein two sides of said rectangular cross-section of said protrusions are perpendicular to said predetermined direction.
6. The bonding tool of Claim 1, wherein said bond foot is characterized by a foot area, wherein said protrusions contact said ribbon over a protrusion area, and wherein said protrusion area is between 20 and 60 percent of said foot area.

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

Ono (as translated)	JP 14313851	Oct. 25, 2002 ²
Oishi	6,824,630 B2	Nov. 30, 2004 (Jul. 14, 2003)

There are two grounds of rejection before us on appeal: (1) claims 1 and 2 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Ono; and (2) claims 1-6 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Oishi. The Examiner found that the relationship between the

² References to Ono are by way of the full English translation of record, provided with the Examiner's Answer. (Ans. 3-4).

protrusion height and the thickness of the ribbon is a functional limitation that does not limit the structure of the apparatus. (Ans. 4 and 5). The Examiner additionally found that both Ono and Oishi teach the claimed bond foot with protrusions extending therefrom. *Id.*

Appellants contend that the relationship of the protrusion height to the thickness of the ribbon is a physical dimension of a claimed element. (Br. 4 and 5). Appellants further contend that neither Ono nor Oishi teaches the physical dimension of the protrusion height such that neither reference anticipates the present claims. *Id.*

ISSUE

Based on the contentions of the Examiner and the Appellants, the issue presented is:

Have Appellants shown error in the Examiner's determination that the thickness of the ribbon does not limit the apparatus?

We answer this question in the affirmative.

FINDINGS OF FACT

The record supports the following Findings of Fact (FF) by a preponderance of the evidence.

1. Appellants' Specification states:

A typical gold bonding ribbon is normally 1.0 mil thick and precut to the length needed to span the gap between two bonding pads.

(Spec. 1, ll. 19-20).

2. Appellants' Specification states:

Each protrusion can be characterized by the area, A , of the end of the protrusion that contacts the ribbon and by the distance, H , by which the protrusion extends from the face of the bond foot. The contact area must be chosen such that the area is small enough to cause the surface of the ribbon to deform under the pressure applied during bonding. The distance H must be chosen such that the protrusions do not penetrate the ribbon to a depth that would significantly alter the physical integrity of the ribbon.

In general, A and H will depend on the force with which the bonding tool is pressed against the ribbon, the number of protrusions, and the material from which the ribbon is constructed. It should be noted that the face of the bond foot provides a stop that sets the maximum depth to which the protrusions can penetrate the ribbon.

(Spec. 4, ll. 23-33).

3. The protrusion height is fixed when the bonding foot is manufactured. (*See* Spec. p. 6, l. 30 – p. 7, l. 3).
4. Ono teaches connection strap (ribbon) thickness of 0.1 mm. ([0033]).
5. Ono is silent with respect to the height of the protrusions.
6. Ono teaches a bond foot having multiple non-skid irregularities (a plurality of protrusions) extending therefrom for pressing a connection strap (ribbon) against a substrate to provide a nonskid property between the strap and ultrasonic horn. ([0043]; Figures 4(a) and 4(b), reference number 6).
7. Ono teaches an ultrasonic wave generator connected to the bonding tool, which inherently agitates the bond foot and moves it in a predetermined pattern. ([0044], [0045]).

8. Ono fails to expressly teach protrusions having a height greater than 40 percent or between 40 and 80 percent of the ribbon thickness.
9. Oishi teaches ribbon thicknesses of about 35 μm . (Col. 1, ll. 12-13).
10. Oishi is silent with respect to the height of the projections (protrusions).
11. Oishi teaches a bond foot having a plurality of projections (protrusions) (Ref. # 9) extending therefrom for pressing a cable (ribbon) against a substrate, a transducer for causing said bond foot to move in a predetermined pattern with respect to the substrate while the bond foot is pressed against the ribbon. (Col. 5, ll. 21-54, col. 6, ll. 14; Fig. 2).
12. Oishi teaches projections (protrusions) (Ref. # 9) that comprise trapezoidal cross-sectional shapes (truncated pyramids) having a top surface parallel to a surface of the cable, the projections all having the same height. (Col. 5, ll. 32-45; Fig. 2 and 5).
13. Oishi fails to expressly teach protrusions having a height greater than 40 percent or between 40 and 80 percent of the ribbon thickness.
14. Oishi teaches that the elongated projections “are caused to bite or cut slightly into the insulation coating layer.” (Col. 6, ll. 11-13).
15. Oishi teaches ultrasonic welding, which transmits an ultrasonic vibration to the bonding horn. (Col. 2, ll. 44-50).
16. Oishi describes that proper ultrasonic welding cannot be performed when the coating material on the ribbon clogs the spaces between

the prior art protrusions, because the leading end surfaces of the protrusions cannot be pressed into contact with the conductive element. (Col. 2, ll. 7-23).

17. Oishi teaches that the projections (protrusions) according to the invention allow for ultrasonic welding without clogging the spaces between the projections and without breaking the cable (ribbon). (Col. 3, l. 44 – col. 4, l. 5).

PRINCIPLES OF LAW

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of Cal.*, 814 F.2d 628, 631 (Fed. Cir. 1987), *cert. denied*, 484 U.S. 827 (1987). Analysis of whether a claim is patentable over the prior art under 35 U.S.C. § 102 begins with a determination of the scope of the claim. We determine the scope of the claims in patent applications not solely on the basis of the claim language, but upon giving claims their broadest reasonable construction in light of the Specification as it would be interpreted by one of ordinary skill in the art. *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004).

In construing claims "we search for the ordinary and customary meaning of a claim term to a person of ordinary skill in the art. We determine this meaning by looking first at intrinsic evidence such as surrounding claim language, the specification, the prosecution history, and also at extrinsic evidence, which may include expert testimony and dictionaries.” *L.B. Plastics, Inc. v. American Home Prods., Inc.*, 499 F.3d

1303, 1308 (Fed. Cir. 2007) (citing *Phillips v. AWH Corp.*, 415 F.3d 1303, 1314-19 (Fed. Cir. 2005) (en banc)). The properly interpreted claim must then be compared with the prior art.

ANALYSIS

Claim Interpretation

After consideration of both the Examiner's and Appellants' contentions, we agree with Appellants that the claimed protrusion height to ribbon thickness ratio physically limits the "plurality of protrusions," such that the protrusion height is a structural feature of the apparatus. (Br. 4). The Examiner contends that because the apparatus can be used on ribbons of various dimensions, the relationship of protrusion height and ribbon thickness does not impart patentability to the claims. (Ans. 7). We are not persuaded by the Examiner's logic. The protrusion height is fixed when the bonding foot is manufactured. (FF 3). Thus, even if the ribbon thickness were changed, the protrusion height would not change as it is part of the bonding foot. The relationship between the protrusion height and the ribbon thickness would still have to be satisfied in order for the bonding tool to meet the present claims. Therefore, the recited relationship between protrusion height and ribbon thickness imparts a structural limitation to the claimed bonding tool.

Further, although the ribbon thickness may be varied, the claims are not indefinite under 35 U.S.C. § 112, 2nd paragraph. As evidenced by Appellants' Specification, the ribbon thickness is within the purview of one of ordinary skill in the art. (FF 1). Thus, one of ordinary skill in the art would have been able to determine the ribbon thicknesses referenced in the

claims in accordance with the requirements of 35 U.S.C. 112, 2nd paragraph. *Orthokinetics Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1576 (Fed. Cir. 1986) (“[a]s long as those of ordinary skill in the art realized that the dimensions could be easily obtained, §112, 2d ¶ requires nothing more”). In addition, for a particular ribbon thickness, one of ordinary skill in the art would have been able to determine whether or not a particular apparatus infringes the claims in light of the claimed relationship between the protrusion height and ribbon thickness. *Geneva Pharms., Inc. v. GlaxoSmithKline PLC*, 349 F.3d 1373, 1384 (Fed. Cir. 2003) (“[a] claim is indefinite if its legal scope is not clear enough that a person of ordinary skill in the art could determine whether a particular [product or method] infringes or not.”). Also, the phrase “said protrusions having a height greater than 40 percent of said ribbon thickness” is as accurate as the subject matter of the claims permits, in order to account for ribbons of various thicknesses. *Orthokinetics*, 806 F.2d at 1576. Therefore, the claims sufficiently comply with 35 U.S.C. 112, second paragraph.

Discussion of Anticipation Rejections

Having determined that the relationship to protrusion height to ribbon thickness is a structural limitation of the claims, we now turn to the claim rejections under 35 U.S.C. § 102. Both Ono and Oishi are silent as to the relationship between protrusion height and ribbon thickness and as a result do not expressly teach the claimed relationship. However, if Ono and Oishi teach the protrusion height and ribbon thickness, the ratio of protrusion height to ribbon thickness could then be calculated. Although both Ono and Oishi teach ribbon thicknesses (FF 4 and 9), both are silent with respect to

the height of the protrusions. (FF 5 and 10). Thus, Ono and Oishi do not expressly or inherently teach the relationship between the ribbon thickness and the height of the protrusions. Therefore, the references fail to teach all of the limitations of the claims as required for anticipation. *See Verdegaal Bros.*, 814 F.2d at 631. Accordingly, we reverse the Examiner's decision to reject the claims as being anticipated by Ono and Oishi.

NEW GROUNDS OF REJECTION

The following new ground of rejection is entered pursuant to 37 C.F.R. § 41.50(b) (2007). Claims 1 and 2 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ono and claims 1-6 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Oishi. The following rejections are based on a ribbon having a particular thickness.

Principles of Law Pertaining to New Grounds of Rejection

“Section 103 forbids issuance of a patent when ‘the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.’” *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1734 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of skill in the art. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). *See also KSR*, 127 S. Ct. at 1734 (“While the

sequence of these questions might be reordered in any particular case, the [*Graham*] factors continue to define the inquiry that controls.”)

Rejection of claims 1 and 2 as being unpatentable over Ono

Ono teaches a bond foot having a plurality of protrusions extending therefrom for pressing a connection strap (ribbon) against a substrate. (FF 6). Ono teaches an ultrasonic wave generator connected to the bonding tool, which inherently agitates the bond foot and moves it in a predetermined pattern. (FF 7).

Ono fails to expressly teach protrusions having a height greater than 40 percent or between 40 and 80 percent of the ribbon thickness. (FF 8). However, the height of the non-skid irregularities is a variable that depends on various factors such as the thickness of the connection strap. In manufacturing the bond foot, one of ordinary skill in the art would have optimized the height of the irregularities to fall within Appellants’ claimed ratios so that the irregularities would have performed their desired “nonskid” function. *See In re Kulling*, 897 F.2d 1147, 1149-50 (Fed. Cir. 1990). Appellants have provided no credible evidence that there are any unexpected differences between the prior art apparatus and the presently claimed apparatus. *See In re Merck & Co.*, 800 F.2d 1091, 1099 (Fed. Cir. 1986). Therefore, the relationship of the height of the non-skid irregularities to the thickness of the connection strap would have been obvious to one of ordinary skill in the art at the time of the invention.

Rejection of claims 1-6 as being unpatentable over Oishi

Oishi et al. teaches a bond foot having a plurality of projections (protrusions) extending therefrom for pressing a cable (ribbon) against a substrate, a transducer for causing the bond foot to move in a predetermined pattern with respect to the substrate while the bond foot is pressed against the ribbon. (FF 11). For claims 3 and 4, the projections comprise truncated pyramids having a top surface parallel to a surface of the cable, the protrusions all having the same height. (FF 12).

Oishi fails to expressly teach projections having a height greater than 40 percent or between 40 and 80 percent of the ribbon thickness. (FF 13). Oishi teaches that the elongated projections “are caused to bite or cut slightly into the insulation coating layer.” (FF 14). Oishi is silent as to the meaning of “slightly.” Therefore, the height of the projections is a variable that depends on various factors such as the thickness of the cable. In addition, Oishi recognizes that the structure of the projections affects the clogging of the spaces between projections and breakage of the cable. (FF 16 and 17). In manufacturing a bond foot, one of ordinary skill in the art would have optimized the height of the projections to fall within Appellants’ claimed ratios so that the projections would have performed their desired “biting” or “cutting” function without clogging the projections or breaking the cable. *In re Boesch*, 617 F.2d 272, 276 (CCPA 1980). Appellants have provided no credible evidence that there are any unexpected differences between the prior art apparatus and the presently claimed apparatus. *See Merck*, 800 F.2d at 1099. Thus, the relationship of the height of the projections to the thickness of the cable would have been obvious to one of ordinary skill in the art at the time of the invention.

Regarding claim 5, Oishi teaches ultrasonic welding, that transmits an ultrasonic vibration to the bonding horn. (FF 15). Oishi is silent as to the orientation of the motion with respect to the rectangular cross sections of the protrusions. However, the pattern of motion of the transducer or sonic wave generator is a functional limitation that depends on how the device is operated. Because Appellants' claimed device and Oishi's device are structurally the same or similar, such devices would reasonably be capable of functioning in a similar manner to move in a predetermined direction as claimed. In light of the above discussion, Appellants' arguments that Oishi is silent as to the bond foot direction of motion (Br. 5) are not persuasive.

Regarding claim 6, Oishi does not expressly teach that the protrusions contact the ribbon over a protrusion area, and wherein said protrusion area is between 20 and 60 percent of the foot area. However, this limitation is a functional limitation and depends on how the bonding tool is operated. Indeed, Appellants' Specification states that the protrusion area "depends on the force with which the bonding tool is pressed against the ribbon, the number of protrusions, and the material from which the ribbon is constructed." (FF 2). Because Appellants' claimed device and Oishi's device are structurally the same or similar, such devices would reasonably be capable of functioning in a similar manner to provide the protrusion area as claimed. In light of the above discussion, Appellants' arguments regarding the Examiner's calculations of foot area (Br. 5 and 6) are not persuasive.

CONCLUSION

For the foregoing reasons, Appellants have shown reversible error on the part of the Examiner in rejecting claims 1 and 2 under 35 U.S.C. § 102 (b) as being anticipated by Ono and claims 1-6 under 35 U.S.C. § 102(e) as being anticipated by Oishi.

In addition, Claims 1 and 2 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ono and claims 1-6 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Oishi.

ORDER

The Examiner decisions rejecting claims 1 and 2 as being anticipated by Ono and claims 1-6 as being anticipated by Oishi are reversed.

This decision contains a new ground of rejection pursuant to 37 C.F.R. § 41.50(b). 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

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

REVERSED

NEW GROUND OF REJECTION (37 C.F.R. §41.50(b))

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