

54 F.3d 1570

34 U.S.P.Q.2d 1673

SOUTHWALL TECHNOLOGIES, INC., Plaintiff-
Appellant,

v.

CARDINAL IG COMPANY, Defendant-Appellee.

No. 94-1243.

**United States Court of Appeals,
Federal Circuit.**

May 10, 1995.

Rehearing Denied; Suggestion for Rehearing

In Banc Declined

June 21, 1995.

Noemi C. Espinosa, Brobeck, Phleger & Harrison, of Palo Alto, CA, argued for plaintiff-appellant. With him on brief were William L. Anthony, Jr. and Douglas C. Rawles. Of counsel was Luther Kent Orton.

V. Bryan Medlock, Jr., Richards, Medlock & Andrews, of Dallas, TX, argued for defendant-appellee. With him on brief was Paul V. Storm.

Before MICHEL, LOURIE and BRYSON, Circuit Judges.

MICHEL, Circuit Judge.

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Southwall Technologies, Inc. (Southwall) appeals the March 2, 1994 decision of the United States District Court for the Northern District of California, Docket No. C-92-0327-DLJ, granting summary judgment for Cardinal IG Company (Cardinal) that Cardinal's LOE₂ window glazing product cannot infringe Southwall's Reexamined U.S. Patent No. B1 4,799,745 (the '745 patent). Because the district court as a matter of law correctly interpreted the claims of the '745 patent to foreclose literal infringement and correctly concluded that, as limited by prosecution history, the range of permissible equivalents precluded infringement under the doctrine of equivalents, we affirm.

BACKGROUND

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The invention of the '745 patent is an improved heat mirror, a thin, transparent coating applied to glass or plastic that allows visible light to pass through but reflects heat (infrared light). Such coatings are useful as window glazing materials. A heat mirror generally comprises one or more thin layers of silver, which are transparent to visible light but reflect heat, spaced apart by a layer of dielectric material, typically metal oxide, an anti-reflective, non-absorbing material that decreases the reflection and increases the transmission of visible light. Two silver layers spaced apart by a dielectric layer form a Fabry-Perot interference filter. The heat mirror may also include additional layers of dielectric or other materials due to manufacturing constraints.

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The specification of the '745 patent describes the invention as an improvement over the heat mirror of the Apfel patent, U.S. Patent No. 3,682,528. The Apfel patent teaches that to obtain thin, optically suitable layers of silver, it is necessary to first lay down a thin "nucleation" layer of nickel and then apply the silver over the nickel by vacuum deposition methods. Apfel further teaches that the silver layer may be coated with a thin layer of vapor-deposited nickel (a post-coat layer) to improve the durability of the heat mirror if another layer, such as a dielectric layer, is to be applied over the silver layer. Apfel's nucleation and post-coat layers may be a clear dielectric material such as titanium oxide rather than nickel. Because the nucleation and post-coat layers are time consuming and expensive to produce, an objective of Southwall's invention was to provide a Fabry-Perot filter with minimal complexity and production steps. The invention of the '745 patent accomplishes this objective by "employing as the interference filter a multilayer stack including at least two separate discrete continuous sputter-deposited transparent metal layers separated from one another by discrete continuous layers of dielectric." U.S. Pat. No. 4,799,745, col. 2, lines 21-25.

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Claim 14 of the reexamined¹ '745 patent, asserted by Southwall, recites (emphasis added):²A visually transparent, infrared reflecting composite film comprising a transparent support having adhered to one surface thereof an interference filter having a plurality of continuous directly contiguous stacked layers, said layers comprising:

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a. a dielectric layer,

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b. [a] discrete sputter-deposited transparent metal layer,

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c. one or more pairs of layers, each pair comprising a dielectric spacer layer and a discrete sputter-deposited transparent metal layer, and

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d. a dielectric outer layer,

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wherein the dielectric is a sputter-deposited dielectric; the metal layers each comprise silver and each are from 4 to 17 nm in thickness and the dielectric layers each have an index of refraction of from about 1.75 to about 2.25 with the spacer layers having a thickness of from 70 to 100 nm and outer layers having a thickness of from about 30 nm to about 70 nm.

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In other words, claim 14 recites a support, such as glass or plastic, which is coated with "continuous directly contiguous stacked layers" of sputter-deposited³ dielectric, silver, sputter-deposited dielectric, silver and, finally, sputter-deposited dielectric material. The '745 specification defines "directly contiguous" as having "its usual meaning of being in actual

contact, i.e., of being adjoining." When the examiner nevertheless questioned the meaning of "directly contiguous" in a July 5, 1988 office action, Southwall replied:

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The term "directly" as used in the claims is intended to mean that the layers are present or laid down contiguous with one another without intervening layers. In other words, no nucleation layers are present between two "directly contiguous" layers or between layers which are laid down "directly" on one another.

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In accordance with Southwall's own definition, unlike the interference filter disclosed in the Apfel patent, the interference filter recited in claim 14 can have no additional layers between the silver and the sputter-deposited dielectric layers, not even nucleation or sacrificial barrier layers.

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Cardinal's LOE² product consists of the following layers on a glass support: zinc oxide (a dielectric), silver, titanium oxide (a dielectric), zinc oxide, silver, titanium oxide, zinc oxide, titanium dioxide and a final zinc oxide layer. The titanium oxide layer is formed by a two-step process in which titanium metal is first sputtered in a nonreactive argon atmosphere to form a layer of titanium metal covering the silver layer. The zinc oxide layer is formed by a reactive sputtering process involving the sputtering of zinc metal in an oxygen atmosphere. Sputtered zinc metal reacts with the oxygen to form zinc oxide which is deposited directly onto the surface. During this process the layer of titanium metal already there is converted to titanium oxide by the action of oxygen.⁴ The titanium metal layer acts as a "sacrificial barrier layer" by protecting the silver layer from oxidation during formation of the zinc oxide dielectric layer.⁵ For purposes of summary judgment analysis, we assume it is completely converted to titanium oxide during this step. In sum, Cardinal's zinc oxide layer is formed by a one-step reactive sputtering process in which zinc oxide is directly deposited, whereas its titanium oxide layer is formed by a two-step process wherein the first step requires deposition of titanium metal and the second step requires oxidation of titanium metal to create titanium oxide.

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Southwall filed the present suit on January 14, 1992 alleging that Cardinal's LOE² heat mirror infringes the '745 patent. Cardinal moved for summary judgment on the grounds that (1) its product does not infringe the '745 patent, (2) the '745 patent is invalid for failure to state the best mode of the invention, and (3) the '745 patent is invalid as either anticipated by or obvious in light of the prior art. The district court granted Cardinal's summary judgment motion on the first ground but denied it on the other two. Southwall appeals the ruling that Cardinal does not infringe the '745 patent, either literally or under the doctrine of equivalents.

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We have jurisdiction over this patent infringement action pursuant to 28 U.S.C. Sec. 1295 (1988).

DISCUSSION

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Summary judgment is appropriate only "if the pleadings, depositions, answers to interrogatories, and admissions on file, together with the affidavits, if any, show that there is no

genuine issue as to any material fact and that the moving party is entitled to judgment as a matter of law." Fed.R.Civ.P. 56(c). The evidence must be viewed in the light most favorable to the nonmoving party. *SRI Int'l v. Matsushita Elec. Corp. of Am.*, 775 F.2d 1107, 1116, 227 USPQ 577, 581 (Fed.Cir.1985) (in banc). Regardless of the nature of the issue determined favorably to the movant, we review the district court's grant of summary judgment de novo. *International Visual Corp. v. Crown Metal Mfg. Co.*, 991 F.2d 768, 770, 26 USPQ2d 1588, 1590 (Fed.Cir.1993).

I. Literal Infringement

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A literal infringement analysis requires two separate steps. First, the asserted claims must be interpreted by the court as a matter of law to determine their meaning and scope. *Markman v. Westview, Instruments Inc.*, 52 F.3d 967, 979 (Fed.Cir.1995) (in banc); *Senmed, Inc. v. Richard-Allan Med. Indus., Inc.*, 888 F.2d 815, 818, 12 USPQ2d 1508, 1511 (Fed.Cir.1989). In the second step, the trier of fact determines whether the claims as thus construed read on the accused product. *Id.*, 12 USPQ2d at 1511. To establish literal infringement, every limitation set forth in a claim must be found in an accused product, exactly. *Becton Dickinson & Co. v. C.R. Bard, Inc.*, 922 F.2d 792, 796, 17 USPQ2d 1097, 1099 (Fed.Cir.1990). Infringement, both literal and under the doctrine of equivalents, is an issue of fact. *SSIH Equip. S.A. v. United States Int'l Trade Comm'n*, 718 F.2d 365, 376, 218 USPQ 678, 688 (Fed.Cir.1983).

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The parties agree that a genuine issue of fact as to whether Cardinal's product literally infringes the '745 patent exists only if Cardinal's titanium oxide and zinc oxide layers together form "a sputter-deposited dielectric" layer. Because Cardinal does not dispute that the zinc oxide is "a sputter-deposited dielectric," the key issue here becomes whether the titanium oxide covering the silver can also be described as "sputter-deposited" as that phrase is used in claim 14 and elsewhere defined in the '745 patent. If Cardinal's titanium oxide layer, which is "directly contiguous" with the silver layer, is not "sputter-deposited," the Cardinal product lacks the limitation of claim 14 that the dielectric layer "directly contiguous" with the silver layer be "sputter-deposited" and Cardinal's product cannot literally infringe the '745 patent.

A. The District Court's Claim Construction

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The district court looked to the prosecution history of the '745 patent to interpret the claim term "sputter-deposited dielectric." The district court concluded the prosecution history requires that a "sputter-deposited dielectric" be formed by a one-step reactive sputtering process and specifically not by a two-step process in which a metal layer is first deposited and then later oxidized.⁶ Because Cardinal's titanium oxide layer is formed by a two-step process in which the titanium is first deposited as a metal layer and then later oxidized, the district court concluded Cardinal's titanium oxide layer could not be a "sputter-deposited dielectric." Because Cardinal's product does not have a "sputter-deposited dielectric" layer "directly contiguous" with the silver layer, the district court further held that, as a matter of law, Cardinal's product could not literally infringe the '745 patent.

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We agree with this analysis. Arguments and amendments made during the prosecution of a patent application and other aspects of the prosecution history, as well as the specification and other claims, must be examined to determine the meaning of terms in the claims. *E.I. du Pont*

de Nemours & Co. v. Phillips Petroleum Co., 849 F.2d 1430, 1438, 7 USPQ2d 1129, 1135 (Fed.Cir.), cert. denied, 488 U.S. 986, 109 S.Ct. 542, 102 L.Ed.2d 572 (1988). The prosecution history limits the interpretation of claim terms so as to exclude any interpretation that was disclaimed during prosecution. ZMI Corp. v. Cardiac Resuscitator Corp., 844 F.2d 1576, 1580, 6 USPQ2d 1557, 1561 (Fed.Cir.1988); Senmed, Inc., 888 F.2d at 818-20, 12 USPQ2d at 1511-13 (rejecting patentee's interpretation of claim term "on" as inconsistent with position taken during prosecution of patent application). Claims may not be construed one way in order to obtain their allowance and in a different way against accused infringers. Unique Concepts, Inc. v. Brown, 939 F.2d 1558, 1562, 19 USPQ2d 1500, 1504 (Fed.Cir.1991).

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In the office action, dated July 5, 1988, the examiner made only one rejection based on prior art, rejecting all the pending claims as anticipated by, or alternatively, as obvious in view of Franz, U.S. Patent No. 3,846,152:

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Franz teaches employing alternate layers of metal/metal oxide to a transparent substrate such as glass or plastic and the use of a protective layer to make a transparent heat reflecting window.... The metal layer is sputter deposited and the metal oxide layer is sputter deposited as a metal and then oxidized, see col. 4, lines 25-28. It is unclear whether the "metal oxide is sputter-deposited" limitation is meant to encompass the situation where the metal oxide is [s]putter deposited as a metal and later oxidized. Until clarification the examiner most [sic, must] interpret the claims broadly.

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In response, Southwall amended an independent claim to describe the dielectric as a "sputter-deposited inorganic metal oxide, compound or salt."⁷ Southwall explained the amendment:

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It is believed that the claims as last presented distinguished patentably over the Franz and Yatabe disclosure[s] but to provide yet additional clear bases for distinction the claims have been amended to specify that the dielectric layer is laid down as a sputter-deposited inorganic metal oxide, compound or salt[.] As pointed out in the specification such layers can be laid down directly by reactive sputtering processes in which the metal is sputtered off of a metal target and directly converted to the oxide, compound or salt by the presence of a suitable gaseous reactant.

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(Emphasis added.) In this response Southwall necessarily disclaimed the examiner's interpretation of "sputter-deposited" metal oxides as encompassing a two-step process in which metal is first deposited as a metal and then oxidized. In contrast to the examiner's interpretation in his office action being responded to, Southwall explained that its sputter-deposited dielectric is laid down in a one-step reactive sputtering process. Thus, the prosecution history limits the interpretation of "sputter-deposited dielectric" layer to exclude any dielectric layer formed by the two-step process. Because Cardinal's titanium oxide layer is formed in this manner it cannot be a "sputter-deposited dielectric."

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Southwall argues, however, that Cardinal's two-step process is an indirect method of forming a "sputter-deposited dielectric," but is still a sputter-deposition process because Cardinal's

titanium dioxide layer exists only by virtue of sputter-deposition. The titanium metal is sputter-deposited and converted to the oxide during sputter-deposition of zinc oxide. According to Southwall, the statement in the prosecution history, "such layers can be laid down directly" implies that the layers can also be laid down indirectly. However, Cardinal's titanium oxide layer is not laid down by sputter deposition as defined in the '745 patent, only the titanium metal layer is. The titanium oxide is formed by treating deposited titanium metal with oxygen. Although this occurs while a different material, zinc oxide, is being sputter-deposited, the reason for the presence of the oxygen does not change the post-deposition oxidation process by which the titanium oxide is formed and does not convert that process into a sputter deposition, i.e., a one-step process.

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Because we conclude that a "sputter-deposited dielectric," as that term is used in claim 14, cannot be formed by a two-step process in which a metal layer is first sputter-deposited and then oxidized, we can only conclude that Cardinal's product does not have a "sputter-deposited dielectric" layer "directly contiguous" with the silver layer. Therefore, like the district court, we hold that as a matter of law Cardinal's product cannot literally infringe the '745 patent.

B. Southwall's Arguments

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Southwall argues that "sputter-deposited dielectric" must be interpreted to also include a dielectric layer formed by the two-step deposition process oxidizing it because Southwall presented evidence that persons of ordinary skill in the art construe the expression to include any dielectric that results from materials laid down by sputtering. Southwall's evidence is affidavit testimony by its two experts describing Cardinal's titanium oxide layer as a "sputter-deposited dielectric." Alternatively, Southwall argues that any conflict between its experts and the prosecution history as to the meaning of "sputter-deposited dielectric" creates a genuine fact issue which makes summary judgment inappropriate.

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Southwall imposes a contorted and incorrect analytical framework on the issues of claim interpretation and literal infringement when it argues:

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2. The uncontroverted testimony of the experts below establishes that those skilled in the art consider a dielectric layer formed either by reactive sputter-deposition or by sputter up-oxidation [the two-step process] of a sacrificial layer to constitute a "sputter-deposited dielectric." Thus, the term "sputter-deposited dielectric" is literally met by the accused Cardinal structure;

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3. Therefore, since the claim as written literally describes the Cardinal structure, the arguments made with respect to that term in the file history must be reviewed to determine whether that expression was given a special meaning in Southwall's arguments which excludes the Cardinal structure. If the phrase was accorded a special meaning in the file history, a determination must be made as to whether the file history should be used merely to "interpret" the claims, or whether a file history estoppel by argument exists as to one or more of the claims.

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Appellant's Brief at 35.

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Southwall's framework fails in several respects. First, the evidence offered by Southwall does not establish the ordinary meaning of "sputtered-deposited dielectric" to one skilled in the art. In his declaration Dr. Stephen F. Meyer merely stated "it seems to me that [Cardinal's] dielectric layer as a whole (including both the titanium dioxide [sic, oxide] and the zinc oxide) could quite fairly be characterized as a 'sputter-deposited dielectric'." Similarly, Robert L. Cormia's declaration states, "it is my opinion that the 'titanium' barrier layer that Cardinal deposits immediately after each of the silver layers is a 'sputter-deposited dielectric' in the LOE² coatings, as that phrase is used in the '745 Patent." Neither Meyer nor Cormia testified as to how one skilled in the art would interpret the term "sputter-deposited" when viewed in light of the claims, specification and prosecution history. This testimony provides only conclusory legal opinions as to whether Cardinal's titanium oxide is a "sputter-deposited dielectric" rather than evidence of how that term is commonly used and understood in the art. See *Becton Dickinson & Co.*, 922 F.2d at 797, 17 USPQ2d at 1100 (affidavit of expert on what constitutes an "extension" in the context of the asserted claim was only legal opinion which did not create a material fact issue).

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Second, Southwall assumes that a claim term is only interpreted by first looking to its meaning in the art and then limiting that meaning in accordance with any relevant prosecution history, by either interpretation or prosecution history estoppel. The terms in a claim, however, are not given their ordinary meaning to one of skill in the art when it appears from the patent and file history that the terms were used differently by the applicant. *Intellicall, Inc. v. Phonometrics, Inc.*, 952 F.2d 1384, 1387, 21 USPQ2d 1383, 1386 (Fed.Cir.1992). A patentee may not proffer an interpretation for the purposes of litigation that would alter the indisputable public record consisting of the claims, the specification and the prosecution history, and treat the claims as a "nose of wax." *Senmed, Inc.*, 888 F.2d at 819 n. 8, 12 USPQ2d at 1512 n. 8. In other words, evidence extrinsic to the patent and prosecution history, such as expert testimony, cannot be relied on to change the meaning of the claims when that meaning is made clear by those documents.

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Because the meaning of "sputter-deposited dielectric" as used in claim 14 is clear from the prosecution history of the '745 patent, Southwall's expert affidavits cannot alter that meaning. Even if Southwall could show that "sputter-deposited dielectric" has a meaning to one skilled in the art different from the definition in the '745 specification and file history, the definition in the patent documents controls the claim interpretation. See *Markman*, 52 F.3d at 981. Thus, we may not consider Southwall's opinion expert testimony as we interpret claim 14 as a matter of law. Because the expert testimony is entitled to no weight, it cannot create a genuine issue of material fact precluding summary judgment. Claim interpretation, as a question of pure law, is amenable to summary judgment and disagreement over the meaning of a term within a claim does not necessarily create a genuine issue of material fact. See *id.* at 979; *Intellicall, Inc.*, 952 F.2d at 1387, 21 USPQ2d at 1386. Any other rule would be unfair to competitors who must be able to rely on the patent documents themselves, without consideration of expert opinion that then does not even exist, in ascertaining the scope of a patentee's right to exclude.

Third, Southwall seems to imply that principles of prosecution history estoppel are relevant in the claim construction step of a determination of literal infringement. There is, however, a clear distinction between following the statements in the prosecution history in defining a claim term, and the doctrine of prosecution history estoppel, which limits expansion of the protection under the doctrine of equivalents when a claim has been distinguished over relevant prior art. *Biodex Corp. v. Loredan Biomedical, Inc.*, 946 F.2d 850, 862, 20 USPQ2d 1252, 1262 (Fed.Cir.1991), cert. denied, 504 U.S. 980, 112 S.Ct. 2957, 119 L.Ed.2d 579 (1992). Claim interpretation in view of the prosecution history is a preliminary step in determining literal infringement, while prosecution history estoppel applies as a limitation on the range of equivalents if, after the claims have been properly interpreted, no literal infringement has been found. See *Senmed, Inc.*, 888 F.2d at 818-21, 12 USPQ2d at 1511-13. The limit on the range of equivalents that may be accorded a claim due to prosecution history estoppel is simply irrelevant to the interpretation of those claims.

Southwall further argues that the district court erred by failing "to recognize that in some claim combinations, the two-step process would not be literally covered by the claims, while in other claim combinations, the claim may be patentable for other reasons and literally cover a two-step dielectric process." Appellant's Brief at 44. Southwall then presents extended discussion tracing the development of claim 14 from the application through the prosecution to show that the cited arguments it made during prosecution did not apply to any earlier version of claim 14.

Whether claim 14 derived from any application claim discussed in the prosecution history is irrelevant to our interpretation of claim 14 in light of that history. "Sputter-deposited dielectric" cannot be interpreted differently in different claims because claim terms must be interpreted consistently. See *Fonar Corp. v. Johnson & Johnson*, 821 F.2d 627, 632, 3 USPQ2d 1109, 1113 (Fed.Cir.1987), cert. denied, 484 U.S. 1027, 108 S.Ct. 751, 98 L.Ed.2d 764 (1988). Interpretation of a disputed claim term requires reference not only to the specification and prosecution history, but also to other claims. *Id.* at 631, 3 USPQ2d at 1112. The fact that we must look to other claims using the same term when interpreting a term in an asserted claim mandates that the term be interpreted consistently in all claims. *Id.* at 632, 3 USPQ2d at 1113 (examining use of term "standard" in nonasserted claims to interpret same term in asserted claims). Accordingly, arguments made during prosecution regarding the meaning of a claim term are relevant to the interpretation of that term in every claim of the patent absent a clear indication to the contrary.

II. Infringement Under The Doctrine of Equivalents

An accused product that does not literally infringe a claim may infringe under the doctrine of equivalents if "it performs substantially the same function in substantially the same way to obtain the same result." *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 608, 70 S.Ct. 854, 856, 94 L.Ed. 1097, 85 USPQ 328, 330 (1950). Only if an accused product contains specific structure which meets all limitations of an asserted claim directed to structure, at least equivalently, can that product infringe under the doctrine of equivalents. *Pennwalt Corp. v.*

Durand-Wayland, Inc., 833 F.2d 931, 935, 4 USPQ2d 1737, 1739 (Fed.Cir.1987) (in banc), cert. denied, 485 U.S. 961, 108 S.Ct. 1226, 99 L.Ed.2d 426 (1988). The doctrine of equivalents, however, is not a tool for expanding the protection of a patent after examination has been completed. *Hormone Research Foundation, Inc. v. Genentech, Inc.*, 904 F.2d 1558, 1564, 15 USPQ2d 1039, 1044 (Fed.Cir.1990). Thus, prosecution history estoppel limits the range of equivalents available to a patentee by preventing recapture of subject matter surrendered during prosecution of the patent. *Townsend Eng'g Co. v. HiTec Co.*, 829 F.2d 1086, 1090, 4 USPQ2d 1136, 1139 (Fed.Cir.1987). The application of prosecution history estoppel raises a question of law which we review de novo. *LaBounty Mfg., Inc. v. United States Int'l Trade Comm'n*, 867 F.2d 1572, 1576, 9 USPQ2d 1995, 1998 (Fed.Cir.1989).

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The issue presented by this appeal is whether, because of the manner of its manufacture, Cardinal's titanium oxide layer is excluded, as a matter of law, from the range of equivalents that can be accorded the limitation "sputter-deposited dielectric."⁸ The district court applied prosecution history estoppel in holding that the range of equivalents could not extend to Cardinal's dielectric layer because, "[t]he Examiner specifically rejected any process where the 'metal oxide is [s]putter-deposited as a metal and later oxidized.' The Cardinal process is such a process." Slip op. at 20. Having concluded that the range of equivalents accorded this limitation in claim 14 could not encompass Cardinal's titanium oxide layer, the district court correctly held that as a matter of law Cardinal's product could not infringe the '745 patent under the doctrine of equivalents.

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A. Estoppel Extends Beyond the Embodiments Shown in Franz

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Southwall contends that the district court erred by limiting the range of equivalents beyond what it necessarily surrendered during prosecution to distinguish its claims over the Franz patent. According to Southwall, it surrendered only the embodiments shown in Franz. To form metal oxide layers, Franz deposits a metal layer and then heats the device in the presence of oxygen. However, Franz also teaches that the uniformity of oxidation may be enhanced by first treating the metallic surface to be oxidized with a surfactant. Southwall argues that only an oxidation process including treatment with a surfactant like Franz's oxidation step, and not the two-step process used by Cardinal, is excluded from the range of equivalents that can be accorded the term "sputter-deposited" because the pertinent prosecution arguments were made only to distinguish Franz, not every two-step process. Southwall asserts that there is a permissible range of equivalents between the wet chemical oxidation process of Franz and the "sputter-deposited dielectric" laid down by reactive (one-step) sputtering and, therefore, it is entitled to have the trier of fact determine whether Cardinal's titanium oxide layer falls within that permissible range of equivalents, making summary judgment inappropriate.

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When a court applies the doctrine of prosecution history estoppel to limit the scope of equivalents, "a close examination must be made as to, not only what was surrendered, but also the reason for such a surrender." *Hi-Life Prods., Inc. v. American Nat'l Water-Mattress Corp.*, 842 F.2d 323, 325, 6 USPQ2d 1132, 1134 (Fed.Cir.1988) (quoting *Bayer Aktiengesellschaft v. Duphar Int'l Research B.V.*, 738 F.2d 1237, 1243, 222 USPQ 649, 653 (Fed.Cir.1984)). Here, the surrender was quite deliberate and express. It can hardly be termed inadequate or ambiguous. Moreover, because the pertinent differences between the Franz process and the Cardinal process

are trivial, the reasons for a surrender of the subject matter of the Franz process would necessarily include a surrender of Cardinal's process. Both processes first involve deposition of a metal layer followed by the heating of that layer in an oxygen atmosphere. In addition, Franz teaches that the uniformity of the resulting metal oxide film can be enhanced by treating the metal layer with a surfactant prior to oxidation. The fact that the surfactant treatment is taught as an optional enhancement to the Franz process, necessarily contemplates that the metal oxide can be formed without this step. Consequently, in distinguishing Franz, Southwall necessarily surrendered all two-step processes for forming the metal oxide layer, both those with and those without the surfactant treatment. Neither does the fact that Franz subjects its metal layer to an oxygen atmosphere in a separate step whereas Cardinal subjects the titanium layer to oxygen during the subsequent step of sputter-deposition of zinc oxide provide a meaningful distinction. The important factor is the presence of oxygen, regardless of the reason for that presence.

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An important feature of Southwall's invention is the ability to reactively sputter a dielectric layer directly contiguous with a silver layer without oxidizing the silver layer. Southwall's process allows formation of a dielectric layer in one step, avoiding the need for barrier layers intervening between the reactively sputtered dielectric and silver layers to protect the silver from oxidation. Such barrier layers complicated the manufacturing process and increased costs. As shown by Franz, a process in which a metal layer is first deposited over a silver layer and then oxidized was known. In distinguishing Franz during prosecution, Southwall chose not to rely on the exact method by which Franz formed his dielectric layer over silver but specifically relied on the fact that Franz showed a multistep process for doing so, whereas Southwall claimed a dielectric layer formed by a one-step process. Thus, an examination of both the nature of and the reason for Southwall's disclaimer of the Franz process demonstrates that Southwall surrendered all "two-step" processes for forming a dielectric contiguous with silver, which would include Cardinal's two-step process of forming titanium oxide, regardless of the precise steps of the process.

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An August 18, 1988 response to an office action, in which Southwall distinguished Franz according to the manner in which Franz formed the dielectric layer, further confirms this point:

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To further emphasize the distinctions between the present invention and the Franz reference, it should be noted that Franz obtains his metal oxide layers by depositing a metal layer and then chemically converting it to the desired oxide.

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In this and the earlier cited statements, Southwall surrendered the Cardinal process which can be described in a manner identical with this statement. Having distinguished the Franz patent on the basis that "Franz obtains his metal oxide layers by depositing a metal layer and then chemically converting it to the desired oxide," whereas Southwall forms its dielectric layer by "reactive sputtering processes in which the metal is sputtered off of a metal target and directly converted to the oxide," Southwall cannot now escape Cardinal's reliance upon this unambiguous surrender of subject matter. See *Lemelson v. General Mills, Inc.*, 968 F.2d 1202, 1208, 23 USPQ2d 1284, 1289 (Fed.Cir.1992) ("Other players in the marketplace are entitled to rely on the record made in the Patent Office in determining the meaning and scope of the patent.")

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In addition, we previously rejected the very argument made by Southwall, that prosecution history estoppel is limited only to embodiments shown in the prior art, in *Wang Labs., Inc. v. Toshiba Corp.*, 993 F.2d 858, 26 USPQ2d 1767 (Fed.Cir.1993). Wang's claims recited memory chips mounted "in a single row." The accused infringers produced a device having memory chips mounted in two rows, which feature Wang argued was equivalent to the "single row" limitation. *Id.* at 866, 26 USPQ2d at 1775. Wang contended that the prosecution history did not exclude a substrate having memory chips mounted in two rows because the two row construction did not read on the prior art. *Id.* at 867-68, 26 USPQ2d at 1775-76. However, because Wang limited the scope of its claims to memory chips mounted "only in a single row" and twice argued before the PTO that its claims were distinguished over the prior art on the basis of this limitation, we held that Wang surrendered the two row construction during prosecution. *Id.* at 868, 26 USPQ2d at 1776. As demonstrated by the facts in *Wang*, the limits imposed by prosecution history estoppel on the permissible range of equivalents can be broader than those imposed by the prior art. *Haynes Int'l, Inc. v. Jessop Steel Co.*, 8 F.3d 1573, 1579, 28 USPQ2d 1652, 1657 (Fed.Cir.1993), clarified, reh'g granted, 15 F.3d 1076, 29 USPQ2d 1958 (Fed.Cir.1994). Such is the case here.

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For these reasons, we hold that the prosecution history limits the range of equivalents that can be accorded the term "sputtered-deposited dielectric" to exclude Cardinal's titanium oxide layer and, therefore, as a matter of law, Cardinal cannot infringe the '745 patent under the doctrine of equivalents.

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B. The Prosecution History Supports the Separate Estoppel Regarding the Manner of Forming the Dielectric

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Southwall further argues that the district court erred by disregarding the holding of *Read Corp. v. Portec, Inc.*, 970 F.2d 816, 23 USPQ2d 1426 (Fed.Cir.1992). Southwall cites *Read* for the proposition that separate statements made by a patentee to distinguish a prior art reference can never create separate estoppels. Under Southwall's theory, where a patent applicant sets forth multiple bases to distinguish between its invention and the cited prior art, no estoppel by argument can attach to the patent claims unless all of the bases taken together also distinguish the accused device from the asserted claims. In other words, unless the accused device contains all the features of the prior art used in distinguishing the asserted claims, estoppel cannot apply.

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During prosecution Southwall distinguished the Franz patent on two bases: 1) that Franz taught a metal oxide layer formed by a two-step process rather than a one-step process, and 2) that Franz taught a filter using only one metal layer and one nonmetal layer rather than "a filter in which two metal layers and a dielectric layer interact to give rise to the filtering properties" as recited in the claims.⁹ Under Southwall's interpretation of *Read*, Southwall only surrendered the two-step process of forming a dielectric when such a process is applied to a filter having a single metal layer. Southwall argues that for Cardinal to be entitled to an estoppel based on Southwall's arguments distinguishing the Franz patent according to dielectric formation, the other distinction over the Franz patent made during prosecution must also apply to Cardinal's product. Therefore, Southwall maintains that the range of equivalents accorded "sputter-

deposited dielectric" is not limited in this case unless Cardinal's product has, like Franz's device, only a single metal layer (which clearly it does not).

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Southwall's interpretation expands Read beyond its facts and rationale. Indeed, it inverts the holding of Read. There, we held multiple arguments do not always create multiple estoppels. Southwall, however, argues that Read holds multiple arguments never create multiple estoppels. The correct law, as Read implies, is that sometimes they do, sometimes they do not.

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Read's asserted claim was directed to a relatively simple mechanical device, a portable loam screening apparatus for separating fine earth material from coarser materials. After the examiner rejected the claims under 35 U.S.C. Sec. 103 as obvious in view of various combinations of references, Read added a limitation reciting:

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a set of wheels mounted to one of said sides [of the apparatus frame] and movable relative to said frame from an operative position for transporting said apparatus to an inoperative position for resting said frame flush on the ground.

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Id. at 819, 23 USPQ2d at 1429. The prosecution history showed that the examiner found this amendment insufficient for patentability but agreed to allow the claims if further amended to include limitations indicating the relationship of the tall end of the apparatus frame to the payload and where the short end of the frame's "closed" characteristics began and ended. The claim was amended to describe these characteristics¹⁰ and allowed on that basis. Id., 23 USPQ2d at 1429.

58

The accused infringer, Portec, argued that Read was estopped by the prosecution history from asserting any range of equivalents for the limitation pertaining to the retractable wheels because Read had pointed out during prosecution that some references did not have this feature. Id. at 824, 23 USPQ2d at 1433. In rejecting Portec's contention we explained:

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Every statement made by a patentee during prosecution to distinguish a prior art reference does not create a separate estoppel. Arguments must be viewed in context. In context, Read distinguished, for example, the Deister reference because of a wealth of differences.... Read pointed out differences not only respecting the wheels ... but also marked differences in other parts of the structure. Thus, any estoppel created by Portec's [sic, Read's] argument encompasses all of these combined distinctions of Deister and not an estoppel respecting each of the individual differences, e.g., that any device with non-movable wheels cannot infringe.

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Id., 23 USPQ2d at 1433 (emphasis in original).

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Read does not hold, as Southwall asserts, that arguments made during prosecution can only create an estoppel regarding the combined distinctions and can never create separate estoppels. Rather, the prosecution history must be examined as a whole in determining whether, based on a particular argument, a particular estoppel applies. See *Texas Instruments, Inc. v. United States Int'l Trade Comm'n*, 988 F.2d 1165, 1173, 26 USPQ2d 1018, 1025 (Fed.Cir.1993). For instance, any argument made regarding the need to distinguish the prior art, in Read the characteristics of the frame, does create a separate estoppel, regardless of other distinctions made. See *Vaupel Textilmaschinen KG v. Meccanica Euro Italia S.P.A.*, 944 F.2d 870, 882, 20 USPQ2d 1045, 1054 (Fed.Cir.1991) ("The doctrine of prosecution history estoppel bars 'a patentee from enforcing its claims against otherwise legally equivalent structures if those structures were excluded by claim limitations added in order to avoid prior art.' " (citation omitted)).

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Estoppel extends beyond the basis of patentability, however. Clear assertions made during prosecution in support of patentability, whether or not actually required to secure allowance of the claim, may also create an estoppel. *Texas Instruments, Inc.*, 988 F.2d at 1174, 26 USPQ2d at 1025. In Read, the patentee argued for patentability based on a combination of elements including retractable wheels because cited prior art disclosed retractable wheels. The patentee recognized that the wheels alone were insufficient to establish patentability. Read, 970 F.2d at 824, 23 USPQ2d at 1433. Because Read argued that patentability was established by its combination of known elements, it created an estoppel only regarding the combined distinctions. It is important to note, moreover, that we concluded that the argument created an estoppel regarding the combination even though the examiner did not allow the claims based on the combination and the associated argument. The claims were still rejected after Read had added the limitation pertaining to the wheels and made the relevant arguments regarding the wheels combined with other elements. Thus, we must examine the character of assertions made in the prosecution history in addition to the result of those assertions, i.e., whether they result in allowance, when determining whether they create an estoppel.

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In the instant case, Southwall did not argue for allowance based on the combination of a "sputter-deposited" metal oxide layer with an interference filter having two metal layers. Because the Franz patent disclosed neither limitation, Cardinal could have reasonably assumed that either one alone could have provided the basis for patentability. Therefore, the rationale of Read applying estoppel to only a combination is not relevant to this case. Accordingly, we may examine Southwall's prosecution argument distinguishing its "sputter-deposited" metal oxide from Franz's separately from Southwall's other arguments distinguishing Franz. When we do, we conclude the separate arguments create separate estoppels.

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C. The Arguments Made to Distinguish Franz Limit All Claims Using the Terms Defined in Those Arguments

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Southwall argues that the arguments made during prosecution regarding the amended claim term "sputter-deposited metal oxide, compound or salt" do not create an estoppel limiting the range of equivalents that can be accorded claim 14 because they were not made about that claim

or the pertinent phrase, "sputter-deposited dielectric." According to Southwall, no equivalents of "sputter-deposited dielectric" were surrendered by these arguments. In Southwall's view, since the arguments concerning Franz were never made to obtain allowance of the claims now being asserted, claims 14 and 36, but instead were directed to now canceled claims in the application, there is no estoppel. Southwall cites no authority explicitly so holding.

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Southwall's analysis contains several flaws. First, whether the material of the layer was described as a "metal oxide, compound or salt" or as a "dielectric" was irrelevant to the arguments Southwall made. They centered on its definition of "sputter-deposited" as describing a one-step reactive sputtering process rather than a two-step process. Therefore, we conclude that this substitution of phraseology did not affect the subject matter surrendered by Southwall in distinguishing the Franz reference.

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Secondly, as explained above, the actual basis for patentability is not the only factor that determines whether an argument in the prosecution history creates an estoppel. We look also to the context and character of the argument.

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And once an argument is made regarding a claim term so as to create an estoppel, the estoppel will apply to that term in other claims. See *Texas Instruments Inc.*, 988 F.2d at 1175, 26 USPQ2d at 1026 ("The prosecution history estoppel we hold proven on claim 12 is equally applicable to claims 14 and 17."). If the arguments made with respect to one claim limit the range of equivalents accorded a term in that claim and that term is later incorporated into another claim, the range of equivalents accorded the other claim must be limited in the same manner. Competitors must be able to rely on the definition of a claim term given in the prosecution history, even when the term is later incorporated into different claims, in order to understand what constitutes infringement. Given the metamorphosis that claims often go through during prosecution, it is often impossible to trace the lineage of the finally allowed claims to decide which arguments pertained to which claims. Therefore, that Southwall might have made the arguments distinguishing Franz with regard to versions of the claims not now at issue does not avoid those arguments limiting later or different versions of the claims.

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Southwall relies on *Wilson Sporting Goods Co. v. David Geoffrey & Assocs.*, 904 F.2d 677, 14 USPQ2d 1942 (Fed.Cir.), cert. denied, 498 U.S. 992, 111 S.Ct. 537, 112 L.Ed.2d 547 (1990), for support of its argument that a term may have a different range of equivalents in different claims. Southwall misreads Wilson which merely states that the range of equivalents accorded a broader, independent claim may be narrower than the range of equivalents accorded a dependent claim in order to prevent the broader claim from encroaching on prior art which the additional limitations of the dependent claims avoid. 904 F.2d at 686, 14 USPQ2d at 1949. Wilson does not address prosecution history. Further, in contrast to Wilson, the issue before us is not the range of equivalents which, if analyzed as hypothetical claims, would be patentable in light of the prior art, but what otherwise equivalent subject matter Southwall surrendered in the arguments made to the examiner.

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We have considered Southwall's other arguments on appeal and find them unpersuasive and separate discussion of them is unwarranted.

CONCLUSION

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Because as a matter of law Cardinal's product does not contain a "sputter-deposited dielectric" layer "directly contiguous" with a silver layer, even equivalently, the district court's grant of summary judgment for Cardinal was not in error. In accordance with the prosecution history, we interpret "sputter-deposited dielectric" to encompass only a dielectric layer formed by a one-step reactive sputtering technique. Moreover, Southwall is estopped by the prosecution history from asserting a range of equivalents for the limitation "sputter-deposited dielectric" that includes a dielectric formed by a two-step process. Because Cardinal's titanium oxide layer, which is directly contiguous with its silver layer, is formed by a two-step process, the titanium oxide is neither literally a "sputter-deposited dielectric" nor an equivalent of that limitation. As such, Cardinal's device lacks the limitation of claim 14 requiring a "sputter-deposited dielectric" "directly contiguous" with a silver layer and, therefore, as a matter of law Cardinal cannot infringe the '745 patent. Accordingly, summary judgment of non-infringement was proper.

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AFFIRMED.

1

Southwall requested reexamination of the '745 patent on the ground that the Chang patent, U.S. Patent No. 4,179,181, presented a substantial new question of patentability

2

Claim 36 of the '745 patent, also asserted by Southwall, is identical to claim 14 except that the specified thickness of the spacer layer in the last clause is different. That difference, however, does not affect our analysis and, therefore, would not justify a different result as to infringement by the accused product

3

To deposit a thin film by sputtering, high energy particles are caused to collide with the surface of a material to dislodge atoms from that material which then deposit on the surface to be coated

4

The final titanium dioxide layer in Cardinal's structure is produced by the same reactive sputtering two-step process used to produce the zinc oxide layer. That layer, however, is not central to any issue in this case

5

Southwall protects the silver layer from oxidation during deposition of the dielectric without adding an additional layer by use of a process involving hydrogen gas

6

Although the district court erred in assuming that the entirety of Cardinal's dielectric layer, rather than only the titanium oxide layer, was formed by a two-step process, this error did not undermine the court's analysis because claim 14 requires that the "sputter-deposited dielectric" layer be "directly contiguous" with the silver layer. Thus, if the titanium oxide layer, which is "directly contiguous" with the silver layer,

cannot be described as a "sputter-deposited dielectric," Cardinal cannot literally infringe that claim even though its zinc oxide layer can be described in this manner

7

Earlier versions of some original '745 claims had also used the narrower limitation "inorganic metal oxide, compound or salt" rather than "dielectric," which was used later. Although Southwall attempts to make much of this difference, it does not affect our analysis because in both instances the key phrase the meaning of which is at issue, "sputter-deposited," is used in exactly the same manner, to modify the general class of dielectric materials as the list of specific dielectric materials. The arguments regarding the "sputter-deposited inorganic oxide, compound or salt" made during prosecution are thus relevant to our interpretation of "sputter-deposited dielectric" for purposes of literal infringement as well as to the application of prosecution history estoppel to limit the range of equivalents accorded that term

8

Cardinal does not contest for purposes of this appeal that "but for" the titanium oxide sacrificial barrier layer, factual issues exist as to whether its product infringes claim 14 under the doctrine of equivalents. Because claim 14 recites a "sputter-deposited dielectric" layer which is "directly contiguous" with a silver layer, additional layers in Cardinal's product intervening between its own "sputter-deposited dielectric" and silver layers would prevent infringement because a limitation would be entirely lacking from the accused device. Southwall suggests no way in which Cardinal's product can satisfy the "directly contiguous" limitation, even equivalently, if the titanium oxide layer is not a "sputter-deposited dielectric."

9

Southwall attempts to deconstruct this latter distinction into seven separate bases for distinguishing its invention from the Franz patent. Appellant's Brief at 40-41. In the prosecution history Southwall provides multiple arguments to demonstrate that Franz does not teach a Fabry-Perot interference filter but these arguments support only one distinction

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The asserted claim recited the limitation as follows:

a frame of generally rectangular cross section and having a tall end and a short end joint [sic] by sides, said short end being closed from an upper edge of said short end to the ground and the lower portion of said tall end being completely open from the ground to a height sufficiently high to permit a payloader to collect the finer material from within the frame.