

United States Court of Appeals for the Federal Circuit

03-1417

W.E. HALL COMPANY, INC.,

Plaintiff-Appellant,

v.

ATLANTA CORRUGATING, LLC,

Defendant-Appellee.

Bruce B. Brunda, Stetina Brunda Garred & Brucker, of Aliso Viejo, California, argued for plaintiff-appellant.

William M. Lee, Jr., Barnes & Thornburg, of Chicago, Illinois, argued for defendant-appellee. With him on the brief was Peter J. Shakula.

Appealed from: United States District Court for the Northern District of Georgia

Judge Jack T. Camp

United States Court of Appeals for the Federal Circuit

03-1417

W.E. HALL COMPANY, INC.,

Plaintiff-Appellant,

v.

ATLANTA CORRUGATING, LLC,

Defendant-Appellee.

DECIDED: June 7, 2004

Before GAJARSA, LINN, and PROST, Circuit Judges.

GAJARSA, Circuit Judge.

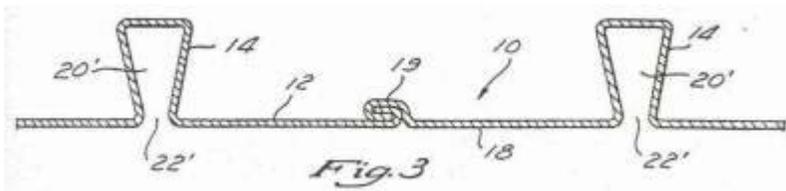
W.E. Hall Company, Inc. (“Hall”), appeals the judgment of the United States District Court for the Northern District of Georgia granting the motion for summary judgment of Atlanta Corrugating, LLC (“Atlanta”) of noninfringement of United States Patent No. 4,838,317 (the “317 patent”). W.E. Hall Co. v. Atlanta Corrugating, LLC, No. 1:01-CV-1261-JTC (N.D. Ga. Sept. 24, 2002). Because we find no error in the district court’s claim construction, we affirm the summary judgment of

noninfringement.

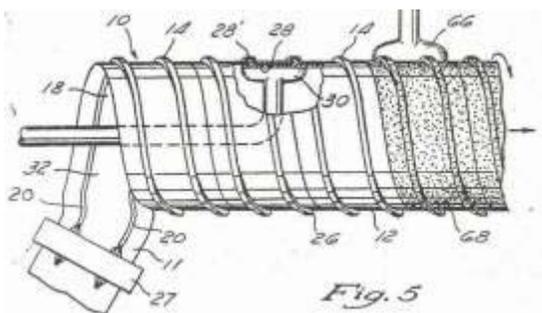
I. BACKGROUND

A. The '317 Patent

Hall is the owner of the '317 patent, entitled "Hydraulically Efficient Ribbed Pipe." The abstract describes the invention as a "hydraulically efficient metal pipe particularly adapted for use in storm drain and sanitary sewer applications" (hereinafter, the "Hall pipe"). '317 patent, Abstract. Metal pipe has had difficulty competing with concrete pipe due to a combination of strength problems and its lack of "hydraulic efficiency." Hydraulic efficiency is a measure of the turbulence generated in a fluid as it flows through a length of pipe. To achieve the strength required for buried storm drain applications, metal pipe manufacturers typically construct their products with either an overly thick gauge or corrugation. Both solutions create economic hurdles to the success of the metal piping products in the marketplace. Oversizing the gauge of the metal directly increases the amount of material required, thereby increasing cost and making the pipe less competitive. Corrugation indirectly increases costs by



reducing hydraulic efficiency, necessitating a larger pipe and, consequently, added material.



The invention described in the '317 patent purports to overcome the drawbacks of metal pipe

with a design that is sufficiently strong to withstand burial, that has a hydraulic efficiency exceeding that of concrete pipe, and most importantly, that is economically competitive with concrete pipe. The Hall pipe achieves these results through the use of “ribs.” Ribs, as used in the Hall pipe, are channels formed in the material that becomes the pipe wall, and are depicted as elements 14 in the cross-sectional view shown above in Figs. 3 and 5 from the '317 patent. After the ribs are formed in the flat metal wall material, the wall material can then be wound to form the pipe, as shown in Fig. 5. Although helical ribs are preferred, the '317 patent also explains that annular ribs may be used to facilitate pipe construction. Id. at col. 4, l. 66 to col. 5, l. 3.

To achieve the strength and hydraulic efficiency necessary for buried storm drain applications, the '317 patent requires a combination of specific rib sizes and spacing specified in the claims and written description. Claim 1 of the '317 patent reads:

A hydraulically efficient underground pipe of single piece construction for use in buried storm drains, said pipe consisting essentially of

a cylindrical metal wall having an 18-12 gauge thickness and defining a pipe diameter within the range of 24-120 inches,

a rigid lock seam extending helically about and along the length of said wall and

a plurality of outwardly projecting walled-structural supporting ribs extending helically about and along the length of said wall and being integrally formed therewith,

said ribs defining a corresponding plurality of open channels formed interiorly thereof,

the width and depth of said open channels being within the range of 0.5 to 1.5 inches and the spacing between said ribs being within the range of 6-12 inches to render the pipe substantially rigid and possess sufficient structural strength to withstand the stresses of being buried underground,

means to increase the hydraulic efficiency of fluid flowing through the pipe consisting of substantial portions of said wall extending between said open channels being of constant radius, and said lock seam being disposed in said portions of constant radius to provide a substantially uninterrupted smooth flow.

Id. at col. 13, ll. 1-23 (emphasis added).^[1] According to the patent, an added benefit of the ribs required by the Hall pipe design is that the open channels can be used to anchor an interior lining into the pipe. Id. at col. 7, ll. 14-62. The open channels may also be filled with a “structural filler, such as concrete” for additional strength and even greater hydraulic efficiency. Id. at col. 8, ll. 18-24.

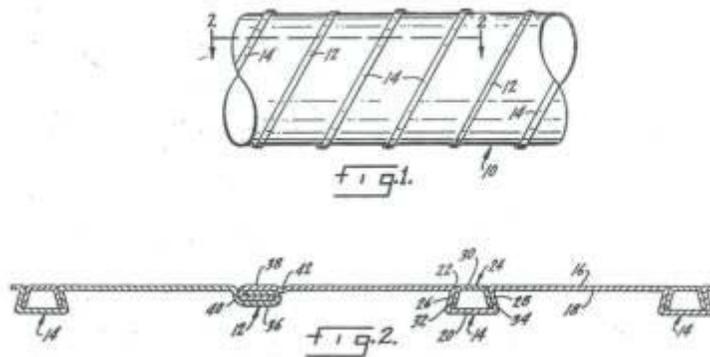
B. The Prosecution History of the '317 Patent

Much of the discussion between the applicants and the United States Patent and Trademark Office (“PTO”) during the prosecution of the '317 patent focused on a prior art reference, United States Patent No. 4,161,194 (the “Nyssen patent”). The Nyssen patent is entitled “Reinforced Smooth Flow Pipe,” and discloses a product similar to that described by the '317 patent. According to the Abstract of the Nyssen patent, the claimed invention is:

[a] reinforced, spirally wound tube or pipe product shaped from an elongated sheet of ductile material formed into adjacent, helical convolutions. The pipe is impressed with at least one longitudinal impression which is trapezoidal in cross-section and formed at the same helix angle as the convolutions so that it is parallel to the juncture of adjacent convolutions. A conforming reinforcement element is located in the impression to strengthen the impression and form a closure of the mouth of the impression.

Figures 1 and 2 from the Nyssen patent depicting the final wound pipe and the

cross-section of the “ductile material” used to form the Nyssen pipe are reproduced



below. The distinction between the Nyssen and Hall pipes, according to Hall, is the spacing of the ribs (numbered 14 in all figures), which permits Hall to omit the metal reinforcement element (numbered 30 in figure 2 above) in the Nyssen patent that closes off the rib opening from the inside surface of the pipe.

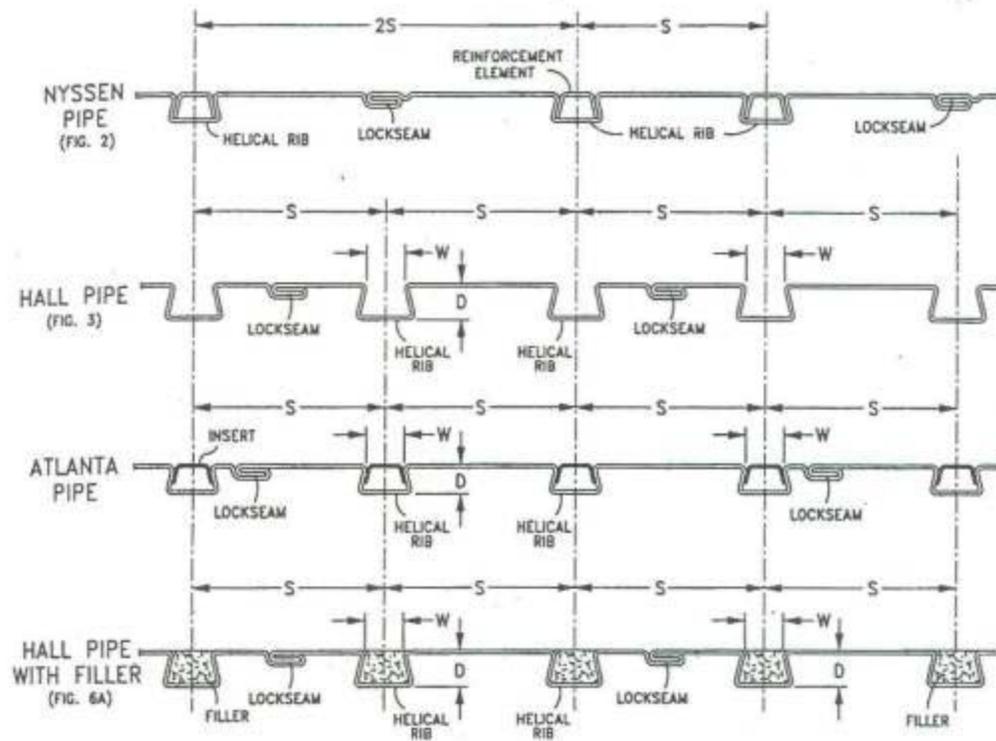
The Examiner rejected the Hall application under 35 U.S.C. § 103 as obvious in light of Nyssen and other references. The prosecution of the '317 patent following the initial rejection consisted of multiple exchanges between the applicants and the PTO. Regarding the "single piece construction" limitation, during a telephone interview with the Examiner following the first office action rejecting the claims under 35 U.S.C. § 103 as obvious in light of the Nyssen patent, the Examiner stated that "there was an insufficient showing in the record to support applicants' contention that the claimed width, depth and spacing of the ribs of the pipe were critical to the improved hydraulics obtained by applicants' pipe." Office Action Response Dated January 19, 1988, at 4. In response, the applicants, inter alia, added the limitation "of unitary construction" to the claims. *Id.* at 14-15. During a subsequent personal interview between the applicants and the Examiner following a final rejection of the claims under 35 U.S.C. § 103 as obvious in light of the Nyssen patent, the Examiner "expressed concern over the meaning of the word 'unitary' . . . , and stated that the Nyssen pipe was of unitary construction." Summary of Personal Interview with Examiner Dated July 22, 1988, at 7. In response to the Examiner's concern, the applicants replaced the "of unitary construction" limitation with a new "of single piece construction" limitation. *Id.*; Preliminary Amendment Dated December 23, 1988, at 1-2.^[2]

The applicants also adjusted the transition term of the claim in response to the Examiner's concerns. During the personal interview between the applicants and the Examiner, the Examiner "noted that the claims, even though they recited the pipe was of unitary construction, did not preclude the use of additional structural element[s] such as that utilized by Nyssen" due to a "comprising" transition included in the claims. Summary of Personal Interview with Examiner Dated July 22, 1988, at 8-9. The applicants responded by amending the claims and changed "comprising" to "consisting of." Preliminary Amendment Dated December 23, 1988, at 1-2. The "consisting of" limitation, however, did not survive prosecution of the application. In an Examiner's Amendment following an interview on February 9, 1989, the Examiner changed the transition term from "consisting of" to "consisting essentially of." The Examiner's Amendment provides no explanation of the reasons for the change. *See* Notice of Allowability; Examiner's Amendment Dated February 10, 1989.

Claim 1, with its dependent claim 2, was finally allowed by the Examiner with the "single piece

construction” limitation and the “consisting essentially of” transition term. The term “open channel” appeared in claim 1 as initially filed and was not amended during the course of prosecution. The Examiner also allowed claims 3 and 4, which underwent the same amendments that are described above for claim 1.

C. The Atlanta Pipe



Both parties agree that the Nyssen, Hall, and the allegedly infringing Atlanta pipe cross-sections are adequately represented by the figure shown below for the purposes of their dispute. Like Nyssen, Atlanta employs a metal insert in the rib that seals the rib opening from the interior of the pipe. The rib size, spacing, and performance parameters (e.g., hydraulic efficiency and burial strength), according to Hall, are not materially different from the pipe described in the '317 patent. Hall maintains that the sole difference between the two pipes is Atlanta's inclusion of a metal insert in the rib opening as shown above. But unlike Nyssen's insert, Hall continues, Atlanta's insert provides no structural reinforcement beyond that already inherent in the pipe as a result of the ribbed construction. Hall accuses Atlanta of adding the metal insert solely to avoid infringement of the '317 patent.

D. The District Court Proceedings

Hall filed an action in federal district court against Atlanta for infringement of the '317 patent, seeking preliminary and permanent injunctions and damages. Atlanta filed counterclaims for a declaration of invalidity of the '317 patent, a declaration of noninfringement, and violation of the antitrust laws.

The district court properly began its analysis with the language of claim 1, identifying the meaning of the terms “single piece construction” and “open channels” as the main point of disagreement between the parties. W.E. Hall Co., slip op. at 9-10. Finding no evidence in the written description or prosecution history that the patentee had chosen to be his own lexicographer, see Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582 (Fed. Cir. 1996), the court assigned the terms their ordinary and customary meanings. W.E. Hall Co., slip op. at 11. The district court explained that it could not interpret the “open channel” requirement to include channels that were closed with metal inserts. Id. Likewise, the district court had difficulty understanding how a “single piece construction” might include multiple pieces. Contrary to Hall’s assertions that the prosecution history required a departure from the ordinary and customary meaning of the claim terms, the district court found that the exchange between the Patent Office and the applicants during the prosecution of the application supported its construction of the terms.

The district court then addressed Hall’s remaining arguments. It rejected the possibility that the term “consisting essentially of”—although a partially open transition term permitting additional elements that do not materially affect the basic and novel properties of an invention—might permit the inclusion of Atlanta’s metal inserts, because the inserts in the Atlanta pipe materially affected cost, hydraulic efficiency, and corrosion, all of which it viewed as novel and basic properties of the invention. Id. at 15-16. Finally, the district court rejected Hall’s argument that the terms should be construed in connection with their function of making a pipe sufficiently strong to withstand burial. Id. at 16-17. In addition to the strength function, the district court explained, the restrictive terms in the claims also functioned to reduce manufacturing costs, to reduce the likelihood of corrosion in the slots,

and to provide an anchor for an interior lining—all distinguishing features that Hall relied on in arguments made to the Examiner during prosecution. Therefore, even if the terms were functional in nature, the Atlanta insert implicated only one out of the four functional requirements. Id.

Accordingly, the district court rejected Hall’s arguments and granted Atlanta’s motion for summary judgment of noninfringement, explaining that because Atlanta’s pipe was not of single piece construction and did not have open channels, there was no issue of material fact as to infringement. W.E. Hall Co., slip op. at 15. Atlanta subsequently moved the district court to dismiss its invalidity and antitrust counterclaims. The district court granted Atlanta’s motion and also ruled in favor of Atlanta on its claim for a declaration of noninfringement. W.E. Hall Co. v. Atlanta Corrugating, No. 1:01-CV-1261-JTC (N.D. Ga. May 8, 2003) (order granting motions to dismiss and finding for Atlanta on the declaratory judgment of noninfringement). Hall timely appealed and we have jurisdiction pursuant to 28 U.S.C. § 1295(a)(1).

II. DISCUSSION

A. Standard of Review

We review a district court’s grant of summary judgment de novo, drawing all factual inferences in favor of the nonmoving party. Anderson v. Liberty Lobby, Inc., 477 U.S. 242, 255 (1986); Moore U.S.A., Inc. v. Standard Register Co., 229 F.3d 1091, 1105 (Fed. Cir. 2000). Patent infringement is a two-step inquiry. Anchor Wall Sys. v. Rockwood Retaining Walls, Inc., 340 F.3d 1298, 1306 (Fed. Cir. 2003). The first step, claim construction, is a question of law subject to de novo review on appeal. Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448, 1456 (Fed. Cir. 1998) (en banc). The second step, comparison of the properly construed claims to the accused product, is a question of fact. Bai v. L & L Wings, 160 F.3d 1350, 1353 (Fed. Cir. 1998).

B. Analysis

When construing claims, “the court should look first to the intrinsic evidence of record, i.e., the patent itself, including the claims, the specification and, if in evidence, the prosecution history.”

Vitronics, 90 F.3d at 1582. We indulge a “heavy presumption” that the claim terms carry their ordinary and customary meaning. Johnson Worldwide Assocs. v. Zebco Corp., 175 F.3d 985, 989 (Fed. Cir. 1999). The ordinary and customary meaning of a claim term to one of ordinary skill in the art may be ascertained from a variety of sources, first, as Vitronics instructs, from the intrinsic evidence of record such as the claims themselves, the written description, and the prosecution history, but also from the “common understanding” of the terms that may be reflected in dictionaries, encyclopedias, and treatises. 90 F.3d at 1582; Tex. Digital Sys., Inc. v. Telegenix, Inc., 308 F.3d 1193, 1203 (Fed. Cir. 2002); Ferguson Beauregard v. Mega Sys., LLC, 350 F.3d 1327, 1338 (Fed. Cir. 2003). While dictionaries may be used to ascertain the plain and ordinary meaning of claim terms, the intrinsic record is used to resolve ambiguity in claim language or, where it is clear, trump inconsistent dictionary definitions. Kumar v. Ovonic Battery Co., Inc., 351 F.3d 1364, 1367-68 (Fed. Cir. 2003) (quoting Tex. Digital Sys., 308 F.3d at 1204 (Fed. Cir. 2002)).

Here, the inventor was not his own lexicographer within the four corners of the intrinsic evidence. Vitronics, 90 F.3d at 1582. We therefore rely on the plain and ordinary meaning of the terms. The disputed terms are straightforward: “open channels” and “single piece construction.” The term “open” is defined as “[n]ot shut in or confined, not surrounded by barriers; to which there is free access or passage on all or nearly all sides; unenclosed, unwallled, unconfined.” 10 Oxford English Dictionary 835 (2d ed. 1989). “Single piece” is sufficiently clear to make even resort to the dictionary unnecessary. Neither party has argued the existence of a customary meaning in the art of metal pipe that contradicts these plain and ordinary meanings. Furthermore, nothing in the specification or the prosecution history clearly suggests that Hall intended to use the terms in a manner other than according to their ordinary meanings. The district court was therefore correct in its construction of the claims.

Hall argues that we should interpret “open channels” to mean channels that are free from reinforcing inserts, and “single piece construction” to mean a construction that has only a single element contributing to the structural integrity of the pipe. According to Hall, both of these definitions are expressly provided in the prosecution history. There is no dispute between the parties as to the ordinary and customary meaning of the terms “open channels” and “single piece construction.” The

disagreement lies in whether the intrinsic evidence sufficiently demonstrates an intent to depart from this meaning and use the terms in an unconventional manner. We agree with the district court that the intrinsic evidence establishes no meaning other than the ordinary and customary meaning of the terms.

Hall mischaracterizes the prosecution history when it argues that the prosecution history “clearly demonstrates” its urged interpretation. Although the arguments made throughout the prosecution of the ’317 patent consistently focus on the reinforcing elements of the Nyssen pipe, the record does not dispositively indicate that Hall intended to use the disputed terms in any manner inconsistent with their ordinary meanings. See *Amgen Inc. v. Hoechst Marion Roussel*, 314 F.3d 1313, 1327 (Fed. Cir. 2003); *Omega Eng’g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1325 (Fed. Cir. 2003) (“To balance the importance of public notice and the right of patentees to seek broad patent coverage, we have thus consistently rejected prosecution statements too vague or ambiguous to qualify as a disavowal of claim scope.”).

For example, in an amendment to the application dated January 19, 1988, the applicants explained that Nyssen “teaches away from applicants’ concept of particularly configured open ribs to obtain both strength and hydraulic efficiency by closing the channels defined by the rib with additional reinforcing elements.” Office Action Response Dated January 19, 1988, at 16. While this argument focuses on distinguishing the obstacle to patentability presented by the Nyssen patent, the success of the argument does not require an interpretation of “open channels” narrower than the ordinary meaning of the term. Rather, the ordinary meaning complements the argument made by Hall. Furthermore, other statements made during the prosecution of the ’317 patent, such as “[a]pplicants’ open ribs define a natural anchor for such liners in the manner described at length in the specification” confirm that Hall was using “open channels” consistent with its ordinary meaning. *Id.* at 15. The district court explained, and we agree, that the above statement could not be true if the term “open channels” was construed as Hall requests.

The same is true for the prosecution history pertaining to the “single piece construction” limitation. The term “single piece construction” evolved from a predecessor term, “unitary construction,” in response to the Examiner’s concern that the Nyssen pipe, although having multiple

pieces, could also be viewed as “unitary.” A summary of a personal interview between the applicants and the Examiner filed February 13, 1984, in the prosecution history describes the following dialogue:

Examiner Bryant stated that without the reinforcing elements, Nyssen did teach a pipe of single-piece construction with open channels, and that he simply added a reinforcing element to the pipe which closed the channels in the same way that Andre added a liner. Andre and Lyon contended that Nyssen by his own admission needed the additional reinforcing element for both structural strength and hydraulic efficiency. Since the reinforcing element is thus a necessary component of the pipe, Nyssen teaches a two-piece pipe, not a pipe of single-piece construction. If he did not need the additional element, asserted Andre, he would not have used it and he pointed to Nyssen’s two-piece construction as the reason for its failure in the marketplace.

Summary of Personal Interview with Examiner Dated July 22, 1988, at 8.[3] The above passage from the prosecution history could be used to argue for a redefinition of the term “single piece construction.” Again, however, it is not necessarily inconsistent with the term’s ordinary meaning.

The above dialogue focuses on the necessity of the reinforcing elements to Nyssen’s design to demonstrate that its own design—which excludes the reinforcing elements—would not have been obvious to one of ordinary skill in the art. As it did regarding the “open channels” limitation, Hall asks the court to read the “single piece construction” limitation as excluding only elements that contribute to the structural integrity of the pipe. Again, while the above argument from the prosecution history might be read using the limited construction that Hall suggests, it may also be read affording “single piece construction” its full ordinary meaning. Because the dialogue is not necessarily inconsistent with the ordinary meaning of the term, we believe that the district court was correct in using the plain and ordinary meaning. See Amgen, 314 F.3d at 1327; Omega Eng’g, 334 F.3d at 1325; Schwing GmbH v. Putzmeister Aktiengesellschaft & Putzmeister, 305 F.3d 1318, 1324 (Fed. Cir. 2002) (“Although prosecution history can be a useful tool for interpreting claim terms, it cannot be used to limit the scope of a claim unless the applicants took a position before the PTO that would lead a competitor to believe that the applicants had disavowed coverage of the relevant subject matter.”). Furthermore, Hall argued during prosecution that “[t]he use of additional reinforcing elements necessarily increases the cost of construction, both in the material and in the added fabrication step” and that “the use of a reinforcing element such as that employed by Nyssen would tend to create corrosion problems where the reinforcing

element abuts the interior wall of the rib.” Office Action Response Dated January 19, 1988, at 17.

These problems described by Hall to distinguish its invention over the Nyssen patent would arise with any metal insert, not just those providing structural reinforcement.

Contrary to Hall’s arguments before this court, the prosecution history does not support Hall’s position that the applicants were distinguishing only reinforcing inserts from the scope of the claims. Although certain statements in the prosecution history might be read as drawing a limited distinction between its own application and the Nyssen reference, other statements apply broadly to all metal inserts without regard to their structural contributions.[4] Rather than rebutting the presumption that Hall was using the terms “open channels” and “single-piece construction” in a manner consistent with their ordinary meanings, the prosecution history often confirms that the plain and ordinary meaning is properly applied here.

Despite failing to overcome the hurdle of ordinary and customary meaning, Hall’s arguments are not entirely baseless. The prosecution history of the ’317 patent records Hall’s attempt to avoid the Examiner’s obviousness rejections and to obtain a patent on what Hall viewed as a significant advance in the field of corrugated pipe. The Examiner appears to have been skeptical of the significance of the rib spacing taught by Hall’s patent. Consequently, the Examiner required amendments limiting the structure permitted under the claim language before he was convinced that Hall’s invention avoided the Nyssen reference.

Our precedents, however, demonstrate that a claim term will not receive its ordinary and customary meaning only in limited situations. CCS Fitness, Inc. v. Brunswick Corp., 288 F.3d 1359, 1366-67 (Fed. Cir. 2002). Those situations include: where the patentee has acted as his own lexicographer and clearly provided an alternate definition for the term; where the intrinsic evidence shows that the patentee distinguished his invention from a prior art reference, expressly disclaimed subject matter, or highlighted a particular feature as important to the invention; or, where the term chosen makes the scope of the claim so unclear as to require resort to the intrinsic evidence for meaning. Id. The inquiry is, after all, how one of ordinary skill in the art would understand the term.

While clear indications in the intrinsic evidence communicating an intent to depart from an ordinary customary meaning will be respected, those that fall short must be disregarded. “[C]laim construction . . . begins and ends in all cases with the actual words of the claim.” Renishaw PLC v. Marposs Societa’ per Azioni, 158 F.3d 1243, 1248 (Fed. Cir. 1998). Where, as here, the written description and prosecution history are ambiguous as to whether the patentee used the claim terms inconsistent with their ordinary and customary meanings, it is the ordinary and customary meanings that the terms obtain.

Despite our affirming the district court’s claim construction, Hall makes one additional argument against the district court’s grant of summary judgment that must be addressed. Hall argues that the transition term “consisting essentially of,” which is included in claim 1, permits additional elements that do not materially affect the novel and basic properties of the invention. Hall is correct that “consisting essentially of” is a partially open term interpreted according to this court’s decision in PPG Indus. v. Guardian Indus. Corp., 156 F.3d 1351 (Fed. Cir. 1998). What Hall fails to recognize, however, is that the transition term “consisting essentially of” permits infringement by products with immaterial elements in addition to the elements already required by the claim. Where an accused product fails to meet each of the elements or limitations required by the claim language itself—for example, as does the Atlanta pipe by having closed channels—a court does not reach the “novel and basic properties” inquiry of PPG Industries regarding additional elements that might be present. Hall’s argument, therefore, cannot succeed.

III. CONCLUSION

For the foregoing reasons, we agree with the district court’s claim construction. The district court’s order granting summary judgment of noninfringement in favor of Atlanta is therefore

AFFIRMED.

IV. COSTS

Costs to appellee.

[1] In the '317 patent, the claim appears as a single paragraph. We have broken the claim into its clauses as reproduced here for the purposes of clarity and analysis. The patent contains four claims in total. Claim 1, however, is representative.

[2] The amendments in response to the personal interview were filed as part of a continuation application following a final rejection by the Examiner. See Preliminary Amendment Dated December 23, 1988, at 4. The Applicant also submitted a preliminary amendment containing additional changes prior to the examination of the continuation application. Id.

[3] In light of this dialogue between the Examiner and the applicants, we think there can be little disagreement that “single-piece construction,” although located in the preamble, serves as a limit on the claims. Cf. Allen Eng'g Corp. v. Bartell Indus., Inc., 299 F.3d 1336, 1346 (Fed. Cir. 2003) (“[T]he preamble may be limiting ‘when the claim drafter chooses to use both the preamble and the body to define the subject matter of the claimed invention.’” (quoting Bell Communications Research, Inc. v. Vitalink Communications Corp., 55 F.3d 615, 620 (Fed. Cir. 1995))).

[4] Hall argued to the Examiner that Nyssen “teaches away from Applicants’ concept of particularly configured open ribs to obtain both strength and hydraulic efficiency by closing the channels defined by the rib with additional reinforcing elements.” Office Action Response Dated January 19, 1988, at 16 (emphasis added). While Hall often connects the concept of “closed” with “reinforcing elements,” at other times it does not. See Office Action Response Dated January 19, 1988, at 18 (“[D]ue to [Nyssen’s] closed ribs, it would not be suitable for use with an interior liner . . .”). This statement in no way suggests that the inserts must provide structural support to the pipe.