Paper No. 19

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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*Ex parte* LUDWIG J. GAUCKLER
and THOMAS GRAULE

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Appeal No. 2001-1668
Application 09/036,754

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ON BRIEF

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Before WARREN, PAWLIKOWSKI and MOORE, *Administrative Patent Judges*.

WARREN, *Administrative Patent Judge*.

*Decision on Appeal*

This is an appeal under 35 U.S.C. § 134 from the decision of the examiner finally rejecting claims 36 through 42. Claim 36 is illustrative of the claims on appeal:

36. A process for the production of a ceramic green part which comprises:

providing a castable, aqueous slip having slip particles including particles selected from the group consisting of oxidic particles and non-oxidic particles therein, said slip particles having an oxide surface and a surface charge, wherein said surface charge is obtained by adding to said slip particles a material selected from the group consisting of an acid and a base;

adding an active substance to the slip wherein said active substance is a chemical which is decomposable due to time delayed, temperature sensitive reactions;

mixing and degassing the resultant slip;

casting the mixed and degassed slip into a mold;

thermally activating the resultant slip and waiting until decomposition products are formed, said decomposition products changing said surface charge of the slip particles leading to solidification, thus forming a wet ceramic green part; and

demolding the wet ceramic green part.

The appealed claims, as represented by claim 36, are drawn to a process for the production of a ceramic green part which comprises at least the steps specified in the claim, wherein an active substance, which is a chemical which is decomposable due to time delayed, temperature sensitive reactions, is thermally activated to form decomposition products that change the surface charge of the slip particles leading to solidification of the slip to form the ceramic green part. Appealed claim 37 specifies that the active substance is a polymer with ester groups. According to appellants, the claimed process "suppresses migration and heterogeneous distributions of soluble components as the hardening step is not dominated by water withdrawal" (specification, page 5).

The references relied on by the examiner are:

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| Bennett et al. (Bennett) | 4,732,213 | Mar. 22, 1988 |
| Fleming et al. (Fleming) | 4,775,401 | Oct. 4, 1988 |

The examiner has rejected appealed claims 36 through 42 under 35 U.S.C. § 103(a) as being unpatentable over Fleming in view of Bennett.

While appellants state in their brief (page 5) that "[a]ll claims should be separately considered," we find that specific, substantive arguments has been presented only with respect to appealed claims 36 and 37. Thus, we decide this appeal based on appealed claims 36 and 37. 37 CFR § 1.192(c)(7) (2000).

We affirm the ground of rejection with respect to appealed claims 36 and reverse with respect to appealed claims 37 through 42.

Rather than reiterate the respective positions advanced by the examiner and appellants, we refer to the examiner's answer and to appellants' brief for a complete exposition thereof.

*Opinion*

We have carefully reviewed the record on this appeal and based thereon find ourselves in agreement with the examiner that the claimed process for the production of a ceramic green part encompassed by appealed claim 36 would have been obvious over the combined teachings of

Fleming and Bennett to one of ordinary skill in this art at the time the claimed invention was made.

As an initial matter, we find that, when considered in light of the written description in the specification as interpreted by one of ordinary skill in this art, *see, e.g., In re Hyatt, 2*11 F.3d 1367, 1372, 54 USPQ2d 1664, 1667 (Fed. Cir. 2000); *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027 (Fed. Cir. 1997), *In re Zletz*, 893 F.2d 319**,** 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989), the plain language of appealed claim 37 requires the formation of a "ceramic green part," wherein the tem "green" in used in its customary, dictionary and art recognized meaning of "[p]ertaining to unsintered powder."[1] We further interpret the claim language "decomposable due to time delayed, temperature sensitive reactions" to include reactions which occur to a small, if any extent, at "temperatures, just slightly above the freezing temperature of the slip" wherein "the reaction can be considerably delayed compared to room temperature" (specification, pages 7-8).

As pointed out by the examiner, Fleming "teaches the basic process of producing a ceramic green part" encompassed by appealed claim 36 (answer, page 3). We agree with the examiner as we find that Fleming discloses the formation of a "porous tube" which can be sintered to a glass rod, wherein the porous tube can be formed from, *inter alia*, fumed silica, with a sol/gel process using quaternary ammonium hydroxide so "that the sol has a pH in the range 11-14, followed by introduction of a compound (or compounds) that results in a lowering of the pH into the range 4-11 (preferably 8-10), the pH being lowered "by addition of alkyl formate . . . or other suitable ester" (col. 3, lines 23-45; see also, e.g., col. 4, lines 1-12, and col. 5, line 59, to col. 6, line 23). Fleming teaches that the sol containing fumed silica is "treated to improve homogeneity" (col. 6, lines 13-14), which includes mixing and evacuation "to remove bubbles" (col. 8, lines 64-66), and that "[a]fter gelation . . . the resulting tubular body is typically removed from the mold and dried" (col. 6, lines 20-22), from which one of ordinary skill in this art would infer that the green part or porous tubular body is demolded in a wet condition.

[1] *McGraw-Hill Dictionary of Scientific and Technical Terms*, page 874 (Sybil P. Parker, ed., New York, McGraw-Hill, Inc. 1994).

We are of the opinion that one of ordinary skill in this art would have reasonably inferred from Fleming that the formic acid ester or other ester will hydrolyze to the corresponding acid when added to the aqueous medium, thus lowering the pH to that taught.[2] This person would also have reasonably known that the extent of hydrolysis of formic acid esters and other esters in a highly alkaline aqueous medium is temperature dependent. Accordingly, we are of the view that, *prima facie*, Fleming would have disclosed each and every step of the claimed process of producing a ceramic green part to one of ordinary skill in this art at the time the invention was made.

However, the examiner further cites Bennett to show that it was known to use in silica sol/gel processes a "latent gelling agent . . . selected from pH-adjusting agents that hydrolyze or decompose thermally to release an acid or consume a base, e.g., hydrolysable esters" (col. 6, lines 3-10). Bennett would have taught one of ordinary skill in the art that gelation can be delayed using "a latent gelling agent" and teaches a number of compounds which can thermally decompose in addition to hydrolyzable esters (col. 5, line 21-49).

Based on the substantial evidence in Fleming and Bennett, we agree with the examiner that, *prima facie*, one of ordinary skill in this art would have been motivated by the teachings of the combination of references to form an alkaline aqueous medium containing silica, a quaternary ammonium hydroxide base, and a hydrolyzable ester, such as a formic acid ester, mixing and degassing the medium, molding the medium, allowing gelation to proceed and demolding and drying the thus formed wet porous tube, in the reasonably expectation that the ceramic green part thus formed can be sintered. Thus, *prima facie*, one of ordinary skill in this art routinely following the combined teachings of Fleming and Bennett would have reasonably arrived at the claimed process of preparing a ceramic green part encompassed by appealed claim 36 without recourse to appellants' specification. *See, e.g., In re Gorman*, 933 F.2d 982, 986-87, 18 USPQ2d 1885, 1888-89 (Fed. Cir. 1991) ("The extent to which such suggestion [to select elements of

[2] It is well settled that a reference stands for all of the specific teachings thereof as well as the inferences one of ordinary skill in this art would have reasonably been expected to draw therefrom, *see generally, In re Fritch*, 972 F.2d 1260, 1264-65, 23 USPQ2d 1780, 1782-83 (Fed. Cir. 1992); presuming skill on the part of this person. *In re Sovish*, 769 F.2d 738, 743, 226 USPQ 771, 774 (Fed. Cir. 1985).

various teachings in order to form the claimed invention] must be explicit in, or may be fairly inferred from, the references, is decided on the facts of each case, in light of the prior art and its relationship to the applicant's invention."); *In re Keller*, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981)("The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art."); *see also In re Dow Chem. Co.*, 837 F.2d 469, 473, 5 USPQ2d 1529, 1531 (Fed. Cir. 1988) ("The consistent criterion for determination of obviousness is whether the prior art would have suggested to one of ordinary skill in the art that [the claimed process] should be carried out and would have a reasonable likelihood of success viewed in light of the prior art. [Citations omitted] Both the suggestion and the expectation of success must be founded in the prior art, not in the applicant's disclosure.").

Accordingly, since a *prima facie* case of obviousness has been established by the examiner over the combined teachings of Fleming and Bennett, we have again evaluated all of the evidence of obviousness and nonobviousness based on the record as a whole, giving due consideration to the weight of appellants' arguments in the brief. *See generally, In re Johnson*, 747 F.2d 1456, 1460, 223 USPQ 1260, 1263 (Fed. Cir. 1984); *In re Piasecki*, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984).

We have carefully considered all of appellants' arguments. The threshold issue raised by appellants is whether the references disclose processes that are reasonably similar to each other and to the claimed process that they constitute analogous prior art and would have been combined by one of ordinary skill in this art (brief, pages 8-9). It is well settled that the examiner must point to some teaching, suggestion or motivation in the prior art to support the combination of references. *See In re Lee*, 277 F.3d 1338, 1343, 61 USPQ2d 1430, 1433-34 (Fed. Cir. 2002); *Smith Industries medical Systems, Inc. v. Vital Signs, Inc.*, 183 F.3d 1347, 1356, 51 USPQ2d 1415, 1420-21 (Fed. Cir. 1999); *In re Mayne*, 1043 F.3d 1339, 1342, 41 USPQ2d 1451, 1454 (Fed. Cir. 1997); *ACS Hosp. Sys., Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577, 221 USPQ 9292, 933 (Fed. Cir. 1984); *see also Keller*, *supra*. The issue with respect to whether Fleming

and Bennett are analogous prior art, is whether the teachings of these references are within the field of appellants' endeavor, or are reasonably pertinent to the particular problem which appellants are attempting to solve. *See In re Clay*, 966 F.2d 656, 23 USPQ2d 1058, 1060-61 (Fed. Cir. 1992).

We cannot agree with appellants' arguments as we find that, as the examiner points out (answer, pages 7-8), Fleming clearly sets forth a sol/gel process of making a porous tube for sintering and thus would be considered to prepare a "green" article or "part" by one of ordinary skill in this art, which we determine to be clearly within the field of appellants' endeavor. We further agree with the examiner that Bennett is concerned with controlling gelation of a sol/gel process utilizing silica and thus would be reasonably pertinent to the particular problem of gelation control of a sol containing the same material which appellants address. Furthermore, we agree with the examiner (*id.*) that these same teachings of the references would have lead one of ordinary skill in this art to combine the teachings of these references with respect to the use latent gelling agents, such as hydrolyzable esters, in order to use sol/gel processes to prepare green pieces.

We have again carefully compared the steps of forming the sinterable porous tube from a silica containing aqueous alkaline medium by a sol/gel process in Fleming with each of the steps specified in appealed claim 36 in light of appellants' arguments (brief, pages 7-8), but remain of the opinion that this reference sets forth each of the specified steps in the order stated in the claim. We also remain of the view that a hydrolyzable ester used to change the pH in Fleming and taught for that purpose by Bennett, is a "chemical which is decomposable due to time delayed, temperature sensitive reactions" as specified in appealed claim 36 because the progress of the hydrolysis of the amount of ester in the medium is dependent in part on the temperature of the medium. In any event, Bennett discloses that "pH adjusting agents" can "decompose thermally" and teaches a number of such agents, which can be used in place of the hydrolyzable ester of Fleming to change the pH of the sol/gel medium taught in Fleming.

Accordingly, based on our consideration of the totality of the record before us, we have weighed the evidence of obviousness found in the combined teachings of Fleming and Bennett with appellants' countervailing evidence of and argument for nonobviousness and conclude

that the claimed invention encompassed by appealed claim 36 would have been obvious as a matter of law under 35 U.S.C. § 103(a).

We cannot reach the same conclusion with respect to appealed claim 37, and thus with respect to claims 38 through 42 which depend thereon. Appealed claim 37 specifies that the active substance is a polymer with ester groups. We fail to find any evidence in the record relied on by the examiner which would have suggested to one of ordinary skill in this art that the "hydrolyzable esters" of Bennett would include a polymer with ester groups when Fleming utilizes formic acid esters. Thus, in the absence of evidence that one of ordinary skill in this art would have used a polymer with ester groups as a pH adjusting agent, we must agree with appellants (brief, page 10) that this specific requirement of claim 37 is not within the ordinary skill of the art. Accordingly, we reverse the ground of rejection with respect to appealed claims 37 through 42. *See In re Jones*, 958 F.2d 347, 349-51, 21 USPQ2d 1941, 1943-44 (Fed. Cir. 1992) ("Conspicuously missing from this record is any *evidence*, other than the PTO's speculation (if it be called evidence) that one of ordinary skill in the herbicidal art would have been motivated to make the modifications of the prior art salts necessary to arrive at the claimed . . . salt.").

The examiner's decision is affirmed-in-part.

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

*AFFIRMED-IN-PART*

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| CHARLES F. WARREN<br>Administrative Patent Judge | ) | |
| BEVERLY A. PAWLIKOWSKI<br>Administrative Patent Judge | ) | BOARD OF PATENT<br>APPEALS AND<br>INTERFERENCES |
| JAMES T.MOORE<br>Administrative Patent Judge | ) | |

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