

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today
(1) was not written for publication in a law journal and
(2) is not binding precedent of the Board.

Paper No. 79 (08/246,370)
108 (90/001,554)
108 (90/001,669)
105 (90/001,772)

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte Arthur J. Nonni

Appeal No. 97-0209
Application 08/246,370¹
Reexamination Nos. 90/001,554,²
90/001,669,³ and 90/001,772⁴

¹Application filed May 17, 1994, for Reissue of U.S. Patent No. 4,568,420, granted February 4, 1986, based on application Serial No. 06/677,657, filed December 3, 1984, which is said to be merged with Reexamination Nos. 90/001,554, 90/001,669, and 90/001,772. According to applicant, this reissue is a continuation of application Serial No. 07/794,531, filed November 25, 1991, which is abandoned.

²Merged reexamination proceeding for U.S. Patent No. 4,568,420, granted February 4, 1986, to International Paper Company, and based on application Serial No. 06/677,650, filed on December 3, 1984. Reexamination request filed July 14, 1988.

³Merged reexamination proceeding for U.S. Patent No. 4,568,420, granted February 4, 1986, to International Paper Company, and based on application Serial No. 06/677,650, filed on December 3, 1984. Reexamination request filed December 15,
(continued...)

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HEARD: February 3, 1997

Before KIMLIN, PAK, and WARREN, Administrative Patent Judges.

PAK, Administrative Patent Judge.

DECISION ON APPEAL

This appeal is taken under 35 U.S.C. § 134 from the examiner's decision finally rejecting claims 11 through 25 and 27 through 30 in this application involving reissue of U.S. Patent No. 4,568,420 (hereinafter referred to as "the Nonni Patent"), which has been merged with three reexamination proceedings. These are all of the claims pending in this application.

We affirm.

BACKGROUND

This is the second appeal of the claimed subject matter

³(...continued)
1988.

⁴Merged reexamination proceeding for U.S. Patent No. 4,568,420, granted February 4, 1986, to International Paper Company, and based on application Serial No. 06/677,650, filed on December 3, 1984. Reexamination request filed May 15, 1989.

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which is directed to a sequential multi-stage process for the bleaching and delignification of lignocellulosic kraft pulp. In the earlier Board decision entered April 1, 1991, the previous merits panel affirmed the examiner's decision rejecting the appealed claims over the same prior art presently relied on by the examiner. See Brief, page 8 and Answer, page 1. Subsequent to that Board decision, a reissue merging three reexamination proceedings was filed with newly amended and newly introduced claims. See Brief, page 8 and Answer, pages 1 and 2. The present claims on appeal differ from the previously considered claims in requiring, inter alia, chlorination of a lignocellulosic kraft pulp before commencing a first alkaline extraction step. In addition to that difference, present claim 30 further requires that the chlorinated kraft pulp be exposed "simultaneously" to caustic and a combination of particular oxidizing agents in the first alkaline extraction step. Present claim 29, on the other hand, further requires that the level of delignification and bleaching attained in the first alkaline extraction step be higher than those attained in certain conventional first

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extraction stages, "without any loss in viscosity beyond that obtained when using any such [conventional extraction stages] at comparable permanganate numbers." Claims 11, 29 and 30 are representative of the subject matter presently on appeal and read as follows:

11. A sequential multi-stage process for the bleaching and delignification of lignocellulosic kraft pulp, which comprises:

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(a) treating the lignocellulosic kraft pulp with [oxygen, ozone, peroxide,] chlorine, chlorine dioxide, or mixtures of chlorine and chlorine dioxide, in an initial stage;

(b) extracting the chlorinated pulp with caustic in the presence of from about 0.2% to about 1.0% of oxygen, based on the oven-dry weight of the pulp, and from about 0.05% to about 1.0% of a hypochlorite, based on the oven-dry weight of the pulp, or from about 0.5% to about 1.0% of a peroxide, based on the oven-dry weight of the pulp in a first alkaline extraction stage.

29. A sequential multi-stage process for the delignification and bleaching of lignocellulosic kraft pulp, which comprises:

(a) delignifying the lignocellulosic kraft pulp with oxygen;

(b) treating the pulp with chlorine, chlorine dioxide, or mixtures thereof;

(c) extracting the chlorinated pulp with caustic in the presence of from about 0.2% to about 1.0% of oxygen, based on the oven-dry weight of the pulp, and from about 0.05% to about 1.0% of a hypochlorite, based on the oven-dry weight of the pulp, or from about 0.05% to about 1.0% of a peroxide, based on the oven-dry weight

of the pulp in a first alkaline extraction stage and whereby additional delignification and bleaching is provided in such extraction stage beyond that attainable by using either C_p(hE), C_p(pE), or C_pE_o alone and without any additional loss in viscosity beyond that obtained when using any such sequence at

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comparable permanganate numbers.

30. A sequential multi-stage process for the bleaching
and delignification of lignocellulosic kraft pulp, which
comprises:

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- (a) treating the lignocellulosic kraft pulp with chlorine, chlorine dioxide, or mixtures of chlorine and chlorine dioxide, in an initial stage; and
- (b) exposing the chlorinated pulp simultaneously to
- (i) caustic, and from about 0.2% to about 1.0% of oxygen, based on the oven-dry weight of the pulp; and
- (ii) from about 0.05% to about 1.0% of a hypochlorite, based on the oven-dry weight of the pulp, or from about 0.05% to about 1.0% of a peroxide, based on the oven-dry weight of the pulp in a first alkaline extraction stage.

PRIOR ART

The examiner relies on the following prior art:

U.S. Patents

Farley et al. (Farley)	3,719,552	Mar. 6, 1973
Histed	4,238,281	Dec. 9, 1980

Publications

Franzreb et al. (Franzreb), "Use of the Oxygen Extraction Stage at Schewabische Zellstoff AG," Publication Series of the Water, Soil and Air Hygiene Assoc., Vol. 56, pp. 27-37 (Oct.

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24, 1983).⁵

Liebergott et al. (Liebergott), Oxidative Bleaching - A Review, Paper presented at the 69th Annual Meeting Tech. Sect. of Canadian Pulp and Paper Asso. in Montreal, Canada, pp. A169-A174 (Feb. 1 and 2, 1983).

⁵Our reference to this publication is to the corresponding English translation of record.

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Rapson et al. (Rapson), "Peroxide or Hypochlorite in the E₂ Stage of CEDED bleaching of kraft pulp: Effect on Shives", Tappi Journal, Vol. 66, No.8, pp. 77-81 (Aug. 1983).

Kruger et al. (Kruger), "Bleaching of sulfite pulps with peroxide and oxygen-possibilities and limitations", 1982 International Pulping Conference, pp. 143-148 (Oct. 20-22, 1982).

Kirk-Othmer Encyclopedia of Chemical Technology (Kirk-Othmer), Vol. 3, page 951 (3rd ed., New York, John Wiley & Sons, 1978).

REJECTION

The claims on appeal stand rejected as follows:

(1) Claims 11 through 25 and 27 through 30 under 35 U.S.C. § 103 as unpatentable over the combined teachings of Liebergott and Farley, with or without the additional teaching of Franzreb;

(2) Claims 11, 15 through 19, 23 through 25, 29 and 30 under 35 § U.S.C. 103 as unpatentable over the combined teachings of Franzreb, Farley and Liebergott with or without the additional teaching of Kirk-Othmer or Histed;

(3) Claims 12 through 14 and 20 through 22 under 35 U.S.C. § 103 as unpatentable over the combined teachings of Franzreb, Farley and Liebergott, with

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or

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without the additional teaching of Kirk-Othmer or
Histed and with or without the teaching of Rapson;

(4) Claim 27 under 35 U.S.C. § 103 as unpatentable
over the combined teachings of Franzreb, Farley,
Liebergott and Kruger, with or without the
additional teaching of Kirk-Othmer or Histed and
with or without the teaching of Rapson;

(5) Claim 28 under 35 U.S.C. § 103 as unpatentable
over the combined teachings of Franzreb, Farley,
Liebergott and Kruger, with or without the
additional teaching of Kirk-Othmer or Histed;

(6) Claim 29 under 35 U.S.C. § 112, first paragraph,
as failing to provide an enabling disclosure for the
invention as now claimed; and

(7) Claim 29 under 35 U.S.C. § 112, second
paragraph, as being indefinite for failing to
particularly point out and distinctly claim the
subject matter which appellants regard as their
invention.

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OPINION

Prior art rejections

In rejecting all of the claims on appeal under 35 U.S.C. § 103, the examiner has relied principally on Liebergott, Farley and Franzreb. Franzreb has been optionally relied on with regard to the first ground of rejection. Kirk-Othmer and Histed have also been optionally relied on with regard to all of the claims. Rapson has been optionally relied on with regard to claims 12 through 14, 20 through 22, 27 and 28. Kruger has been relied on additionally with regard to claims 27 and 28.

Having carefully reviewed the entire record, we agree with the examiner that the claimed subject matter as a whole would have been obvious to one of ordinary skill in the art for substantially those findings and conclusions set forth in the Answer. Accordingly, we affirm the examiner's decision rejecting all of the claims on appeal as unpatentable under Section 103 over the applied prior art. Our reasons for this determination follow.

Initially, we note that while the obviousness of a

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claimed invention cannot be established by combining the teachings of the prior art absent some teaching, suggestion or incentive supporting the combination (see ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984)), this does not mean that the cited prior art references must specifically suggest making the combination (B. F. Goodrich Co. v. Aircraft Braking Sys. Corp., 72 F.3d 1577, 1582, 37 USPQ2d 1314, 1318 (Fed. Cir. 1996); In re Nilssen, 851 F.2d 1401, 1403, 7 USPQ2d 1500, 1502 (Fed. Cir. 1988)). Rather, the test for obviousness is what the combined teachings of the references would have suggested to those of ordinary skill in the art. In re Young, 927 F.2d 588, 591, 18 USPQ2d 1089, 1091 (Fed. Cir. 1991); In re Keller, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981). Moreover, in evaluating such references it is proper to take into account not only the specific teachings of the references, but also the inferences which one skilled in the art would reasonably be expected to draw therefrom. In re Preda, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968). All of the disclosures in a reference must be evaluated for what they

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would have fairly suggested to one having ordinary skill in
the art. In re Boe, 355 F.2d 961, 965, 148 USPQ 507, 510
(CCPA 1966).

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Here, relying on the previous merits panel's decision,
the examiner has made the following factual findings (Answer,
page 10):

It is very clear from the thrust of appellant's specification and the RENARD affidavit, which is the basis for essentially all of the argumentation presented in the brief and reply brief on appeal, that the inventive improvement over the acknowledged state of the art reflected in appellants' claim 1 was considered to be the combination of oxygen with a second oxidizing agent, e.g., a peroxide, in the first alkaline extraction stage of any multistage process for bleaching and delignifying kraft lignocellulosic pulp. It is equally clear that each of the oxidizing agents oxygen, peroxide and hypochlorite had been known to be used individually in the extraction stage of similar multi-stage processes. The latter fact is disclosed in extensive detail in the Liebergott review article.

Consistent with that factual findings, appellant states that the Liebergott reference "discuss[es] the use individually of a hypochlorite, a peroxide or oxygen in the first caustic

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extraction stage of multistage processes of the type to which the present invention pertains." See Brief, page 22.

Appellant also states that the Liebergott reference "pertains to treatment of chlorinated pulps." See Brief, page 50, in conjunction with Brief, page 22. This statement is supported by the Liebergott reference which teaches that chlorination is followed by the caustic extraction. See pages A-169 and A-170. The Liebergott reference also teaches that an oxygen stage can precede chlorination. Compare page A-170 with, e.g., claim 29. According to Table V (The Use of Oxidative Reagents in the E₁ Stage) at page A-173 of the Liebergott reference, the use of oxidizing agents, such as oxygen, a peroxide and a hypochlorite, individually in the first extraction stage subsequent to chlorination generally produces a benefit in terms of delignification and brightness. The kraft pulps produced with oxygen have much better properties in terms of delignification (lower kappa no.) and brightness than those produced with other oxidizing agents, namely a peroxide and a hypochlorite, in the first extraction stage, but have a viscosity lower than that produced with the other

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oxidizing agents in the first extraction stage. See Table V. Appellant also acknowledges that the Liebergott reference discusses at page A-172 the use of oxidizing agents in the first extraction stage to improve the effects on pollution (the color of effluent), the brightness of pulp, and chlorine consumption. See Brief, pages 22-23. Thus, it can be reasonably inferred that the use of a combination of appropriate proportions of oxygen and an other oxidizing agent, namely a peroxide or a hypochlorite, to treat chlorinated kraft pulps in the first alkaline extraction stage would have resulted in the production of kraft pulps having the desired levels of brightness and delignification at the minimum loss of viscosity (less reduction in paper strength), together with the reduction of pollution emission and chlorine consumption associated with conventional multi-stage delignification and bleaching processes. Accordingly, we conclude that the Liebergott reference as a whole would have suggested to a person having ordinary skill in this art to employ appropriate proportions of oxygen and either a peroxide and a hypochlorite in its first alkaline extraction stage with

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a reasonable expectation of producing kraft pulps having desired properties, with the reduction of the pollution emission (improved effluent color) and chlorine consumption associated with its multi-stage bleaching and delignification process.

Albeit the Liebergott reference alone would have been sufficient to establish a prima facie case of obviousness regarding the claimed subject matter, we find additional evidence which would have further compelled or motivated a person having ordinary skill in the art to employ a combination of oxygen and another oxidizing agent, such as a peroxide, in the first extraction stage of the Liebergott reference. Specifically, the Farley reference states (column 1, lines 43-55):

It is known that lignocellulose can be brightened by the action of an aqueous alkaline medium having a temperature of about 50EC.-150EC. and containing dissolved oxygen under pressure. The oxygen severs the bonds which connect the lignin substituents to the cellulose and the alkali carries the released lignin substituents (which are acidic) into solution. In the art, the process is termed "bleaching."

It is a disadvantage of the process that the oxygen causes partial depolymerization of the

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cellulose, decreasing the strength which paper made therefrom would otherwise possess.

The Farley reference then goes on to state (column 1, line 65 to column 2, line 14) that:

The discovery has now been made that the rate of which the aforesaid bleaching occurs is accelerated at any given temperature and oxygen pressure when the aqueous medium has a content of an alkali-solution peroxide (i.e., a peroxide which is soluble in aqueous alkali solution), and when the pH of the medium is in excess of 11. The invention accordingly permits the duration of exposure of the cellulose to oxygen to be decreased with decrease in the depolymerization of the cellulose for attainment of any given improvement in brightness, and increases the daily output of any given plant.

Furthermore, it permits superior bleaching to be achieved under normal commercial conditions. Better bleaching is achieved by the use of oxygen and a peroxide in combination than is accomplished by either used separately or by both in sequence. It appears, therefore, that in the process the water-soluble peroxides act synergistically with the oxygen, functioning both as a bleaching reagent and as an accelerator of the bleaching action of the oxygen.

The invention thus permits a maximum level of brightness to be attained more rapidly than would otherwise be the case.

We recognize that the Farley reference does not expressly mention using a combination of its oxidizing agents to chlorinated (pre-bleached with chlorine) kraft pulps in the

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first alkaline extraction-oxidation stage. However, we determine that a person having ordinary skill in the art would have had a reasonable expectation of successfully treating the chlorinated (pre-bleached with chlorine) kraft pulps with such combination of oxidizing agents to obtain the synergistic results described in the Farley reference because, as indicated supra, the Liebergott reference teaches that an oxidizing agent, such as oxygen, a peroxide or a hypochlorite, can be used to treat chlorinated kraft pulps in the first alkaline extraction stage to improve, inter alia, bleaching and delignification. See In re O'Farrell, 853 F.2d 894, 904, 7 USPQ2d 1673, 1681 (Fed. Cir. 1988) (obviousness does not require absolute predictability of success; instead, all that is required is a reasonable expectation of success). Nowhere does the Liebergott reference disclose that the presence of chlorine interferes with the oxidation bleaching and delignification of lignocellulosic kraft pulps. Note also that chlorine, like oxidizing agents, serves as a bleaching agent, i.e., performs the same function as oxidizing agents. See, e.g., Kirk-Othmer, page 951.

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Moreover, we find that the conventional extraction-oxidation (defined as bleaching) the Farley reference refers to is subjected to either identical or substantially identical conditions as the first alkaline extraction-oxidation stages of conventional multi-stage bleaching and delignification processes, such as those taught by the Liebergott reference. As indicated supra, both recognize that it has been known to employ an individual oxidizing agent in an alkaline treatment stage (at a temperature of 50-150EC) for the bleaching and delignification purposes. Thus, it can be inferred that the improvement stated in the Farley reference, i.e., obtaining a synergistic result through using a combination of oxygen and a peroxide, would be extended to the conventional first alkaline extraction-oxidation stage of the type described in the Liebergott reference which treats chlorinated (pre-bleached with chlorine) kraft pulps.

In view of the foregoing, we have little doubt that, through using a combination of the above oxidizing agents, a person having ordinary skill in the art would have had a reasonable expectation of successfully improving

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delignification and brightness, as well as reduction in pollution emission and chlorine consumption, without decreasing the viscosity significantly (minimum decrease of paper strength). Thus, we concur with the examiner that both the Liebergott and the Farley references taken as a whole would have provided specific motivation to modify the first alkaline extraction stage of the Liebergott reference as discussed above.

As correctly stated by appellant (Brief, pages 29-30), the Franzreb reference is directed to a process for bleaching and delignifying sulfite pulp grades, wherein an extraction stage is connected to the effluent side of an oxygen/peroxide bleaching stage. According to Figures 1 and 2 at pages 98 and 99 of the Franzreb reference, the amount of chlorine used for delignification can be reduced substantially by delivering an effluent from the oxygen/peroxide bleaching stage to the extraction stage. Since the effluent is reasonably expected to contain some oxygen and hydrogen peroxide (as further

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confirmed by the Renard February 28, 1990 declaration⁶ (pages 20-21) (proffered by appellant), we agree with the examiner that the Franzreb reference is relevant. It appears to us that the Franzreb reference, like the Liebergott reference, provides at least a reasonable expectation of successfully reducing the amount of chlorine needed for delignification through the use of oxygen and a peroxide in the extraction stage of the type described in the Liebergott reference. In this regard, we note that the Franzreb reference refers to its extraction stage as "an oxygen extraction stage" which indicates that oxidizing agents are being introduced to the extraction stage via the effluent. See page 95.

Appellant relies on the Renard February 28, 1990 declaration to establish that the effluent described in the Franzreb reference does not contain any meaningful amount of oxidizing agents. See Brief, page 30. However, we find that the Renard February 28, 1990 declaration based its calculation on the wrong process parameters. It simply has not supplied

⁶ Appellant describes it as the Renard February 28, 1990 affidavit even though it is submitted in the form of a declaration.

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any calculation based on the process conditions employed in the Franzreb reference. In any event, it should be clear that the Franzreb reference is not necessary to the outcome of this case. As indicated supra, the combined teachings of the Liebergott and the Farley references are sufficient to support the examiner's conclusion of obviousness within the meaning of 35 U.S.C. § 103.

Appellant appears to argue that the applied prior art references do not teach, nor would have suggested, exposing the chlorinated pulp "simultaneously to" caustic, oxygen and either a peroxide or a hypochlorite as required by claim 30 or extracting the chlorinated pulp with caustic "in the presence of" oxygen and either a peroxide or a hypochlorite as required by the remaining claims on appeal. See, e.g., Brief, pages 25, 26 and 47. This argument is not convincing. As indicated supra, the combined teachings of the Liebergott and Farley references would have provided a reasonable expectation of success, as well as sufficient motivation, to employ the claimed combination of oxidizing agents in the first alkaline extraction stage of the Liebergott reference so that the

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chlorinated pulp can be exposed to or treated with caustic,
oxygen and either a peroxide or a

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hypochlorite. The Farley reference also teaches (column 2,
lines 55-59) that:

The peroxide may all be added at the start
(immediately prior to introducing the pulp into the
pressure vessel), or it may be injected into the
pressure vessel [oxygen pressure] as the bleaching
proceeds.

Given these teachings, it would have been obvious to a person
having ordinary skill in the art to expose the chlorinated
pulp either simultaneously or sequentially (rapid sequential
mixing) to caustic and the oxidizing agents listed above so
long as the chlorinated pulp is exposed to the oxidizing
agents at the start or immediately before the extraction-
oxidation reaction. A person having ordinary skill in the art
would have reasonably expected that the chlorinated pulp would
be treated with caustic in the presence of the mixture of
dissolved oxidizing agents, regardless of the sequences
involved, in the first alkaline extraction step described in
the Liebergott reference. See also In re Burhans, 154 F.2d
690, 69 USPQ 330 (CCPA 1946).

Appellant appears to argue that the applied prior art
references do not teach, nor would have suggested, using the

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claimed amounts of oxygen and either a peroxide or a hypochlorite in the first alkaline extraction stage. See Brief, pages 32-35. However, appellant's argument is unsupported by evidence. The Farley reference, for example, describes using oxygen and a peroxide. See column 2, lines 4-14. The amount of oxygen used is defined in terms of pounds per inch square. See column 3, lines 15-23. The Farley reference specifically states (column 3, lines 17-25) that:

A pressure in the range of 50-150 lb./in.² is preferable as providing very rapid bleaching with little danger of combustion. If preferred, the O₂ oxygen pressure may be less than atmospheric, down to about 2 lb./in.²

absolute. In practice we have obtained good results simply by bubbling air at atmospheric pressure through the aqueous alkaline medium (oxygen pressure approximately 3 lb./in.² absolute), so that that pressure is preferred.

Compare this oxygen pressure with 45 psig oxygen pressure employed in appellant's example 5. The Farley reference also states (column 2, lines 39-46) that:

As a practical matter, we prefer to add an appropriate amount of peroxide to the water intended for use as the aqueous medium in the process. A suitable amount of peroxide can be found by laboratory trial, employing as a start an amount shown in the examples below. We have found that

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0.2% peroxide, calculated as H₂O₂ and based on the dry weight of the fibers, produces a noticeable acceleration in the rate at which the lignin is liberated, so that evidently there is no amount however small.

In addition, the Liebergott reference indicates that the amount of oxygen, a peroxide and a hypochlorite within the claimed range is sufficient for the bleaching and delignification purposes in the first alkaline extraction stage, when the kraft pulps are already pre-chlorinated (pre-bleached). See Table V at page A-173. Under these circumstances, we agree with the examiner that it would have been obvious to one of ordinary skill in the art to employ the claimed quantities of oxygen and either a peroxide or a hypochlorite to treat chlorinated kraft pulps in the first alkaline extraction stage described in the Liebergott reference with a reasonable expectation of improving the bleaching and delignification. Note also that both the Liebergott and the Farley references teach that the amounts of oxidizing agents involved are result effective variables, i.e., affect the level of brightness, delignification and viscosity. See In re Woodruff, 919 F.2d 1575, 1578, 16

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USPQ2d 1934, 1936-37 (Fed. Cir. 1990) (the determination of workable or even optimum value for a result effective variable would be within the ambit of one of ordinary skill in the art); See also In re Boesch, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980).

Appellant appears to argue that the applied prior art does not teach, nor would have suggested, using oxygen prior to chlorination as required by claims 19 through 25. See, e.g., Brief, page 37. We are not persuaded by this argument. As apparent from the disclosure of the Liebergott reference and as indicated supra, an oxygen stage may be provided prior to chlorination. See page A-170.

Appellant does not specifically argue why the Rapson reference would not have suggested the subject matter defined in claims 12 through 14 and 20 through 22. See Brief, pages 82-84. Rather, appellant argues that the Rapson reference does not teach, nor would have suggested, using a combination of oxygen and an other oxidizing agent, such as a peroxide or a hypochlorite, in the first alkaline extraction stage. Id. As indicated supra, the combined teachings of the Liebergott

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and the Farley references already provide specific motivation to employ such combination of oxidizing agents in the first alkaline extraction stage of the type described in the Liebergott reference.

Appellant also argues that the Kruger reference does not teach or suggest the sequence of adding oxidizing agents as recited in claims 27 and 28. As indicated supra, the Farley reference already teaches adding a peroxide to a kraft pulp immediately prior to introducing the pulp into a vessel containing caustic and oxygen (pressurized with oxygen). Compare claim 28 with Farley, column 2, line 55-57 and column 4, lines 10-30. The Farley reference also teaches that a peroxide can be injected into a pressurized (oxygen pressure) vessel "as the bleaching proceeds." It then follows that the sequence of adding oxidizing agents is not important so long as they are added immediately before or at the start of the extraction-oxidation reaction. Accordingly, as indicated supra, we agree with the examiner that adding oxidizing agents in the claimed manner in the first alkaline extraction stage of the type described in the Liebergott reference would have

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been obvious to one of ordinary skill in the art. A person having ordinary skill in the art would have had a reasonable expectation of maximizing the synergistic results described in the Farley reference by exposing the pulps to, for example, both oxygen and a peroxide immediately before or at the start of the extraction-oxidation reaction.

Appellant appears to argue that the synergistic results defined in the "whereby" clause of claim 29 is not taught or suggested by the applied prior art references. See, e.g., Brief, page 51. The "whereby" clause in question is quoted below:

whereby additional delignification and bleaching is [sic, are] provided in such extraction stage beyond that attainable by using either $C_D(hE)$, $C_D(pE)$, or $C_D E_0$ alone and without any loss in viscosity beyond that obtained when using any such sequence at comparable permanganate numbers.

From our perspective, this clause does not distinguish the claimed subject matter from the combined teachings of the applied prior art references. Specifically, the Farley reference teaches that using a combination of oxygen and a peroxide produces synergistic results, i.e., a greater bleaching action than either oxidizing agent alone. See

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column 1, line 71 to column 2, line 14. According to column 2, lines 9-12 of the Farley reference, "water soluble peroxides act synergistically with the oxygen, functioning both as a bleaching reagent and as an accelerator of the bleaching action of the oxygen." This effect "permits the duration of exposure of the cellulose to oxygen to be decreased with decrease in the depolymerization of the cellulose [minimizing the decrease in viscosity] for attainment of any given improvement in brightness. . . ." See column 1, line 71 to column 2, line 2. Thus, the use of a combination of oxygen and a peroxide as the oxidizing agent for the first alkaline extraction stage of a multi-stage bleaching and delignification process of the type described in the Liebergott reference to obtain the synergistic results recited in claim 29 would have been obvious to one of ordinary skill in the art. As indicated supra, one of ordinary skill in the art would have had a reasonable expectation of successfully obtaining the claimed synergistic results.

Having arrived at the conclusion that the evidence of obviousness adduced by the examiner is sufficient to establish

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a prima facie case of obviousness regarding the claimed subject matter, we recognize that the evidence of nonobviousness submitted by appellant must be considered en route to a determination of obviousness/nonobviousness under 35 U.S.C. § 103. See Stratoflex, Inc. v. Aeroquip Corp., 713 F.2d 1530, 1538, 218 USPQ 871, 879 (Fed. Cir. 1983). We need to consider anew the issue of obviousness under 35 U.S.C. § 103, carefully evaluating therewith the evidence of nonobviousness supplied by appellant. See In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984).

Appellant alleges that the claimed subject matter imparts unexpected results, thus rebutting the prima facie case of obviousness adduced by the examiner. See, e.g., Brief, pages 64-78 and 86-87. In support of his position, appellant relies on the showing in the Nonni patent (appellant's specification in this reissue application) and the declarations he executed on November 18, 1992 and May 13, 1994, respectively. Id. The showing in the Nonni patent, namely examples 1 and 5 and Tables 1 and 6, is directed to a comparison between using no oxidizing agent, an individual oxidizing agent and a

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combination of the claimed oxidizing agents in the first alkaline extraction stage involving the treatment of chlorinated (pre-bleached) kraft pulps. This showing evinces that the use of a combination of the claimed oxidizing agents, such as oxygen and a peroxide, imparts synergistic results, i.e., little more than the additive bleaching action attained by using the same oxidizing agents individually. See e.g., Brief, page 66. The showing in the declarations, on the other hand, is directed to a comparison between using chlorinated (pre-bleached) kraft pulps and unchlorinated (not bleached) kraft pulps using a combination of the claimed oxidizing agents. It demonstrates that the use of chlorinated (pre-bleached) kraft pulps results in improvement in pulp strength (less reduction in viscosity) at comparable brightness levels. See Brief, pages 68-76. According to appellant, it also shows that simultaneous introduction of oxygen and an other oxidizing agent to chlorinated kraft pulps at the start of the caustic extraction, as opposed to delaying addition of oxygen and an other oxidizing agent, yields improved pulp strength and brightness. See Brief, pages 77, 86 and 87.

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It is not enough for appellant to show that the results obtained for appellant's invention and the comparative examples are different. Appellant has the burden of establishing that such differences are unexpected. See In re Soni, 54 F.3d 746,749-50, 34 USPQ2d 1684, 1686-87 (Fed. Cir. 1995)(appellant carries the burden of rebutting a prima facie case of obviousness); In re Klosak, 455 F.2d 1077, 1080, 173 USPQ 14, 16 (CCPA 1972) ("the burden of showing unexpected results rests on [appellant] who asserts them"); In re Heyna, 360 F.2d 222, 228, 149 USPQ 692, 697 (CCPA 1966) ("[i]t is incumbent upon appellants to submit clear and convincing evidence to support their allegation of unexpected property"); In re Huellmantel, 324 F.2d 998, 1003, 139 USPQ 496, 500 (CCPA 1963)(synergism has no "magic status"; it must be shown to be unexpected). Upon making a factual, evidentiary inquiry (see In re Johnson, 747 F.2d 1456, 1460, 223 USPQ 1260, 1263 (Fed. Cir. 1984)), we are not persuaded that appellant has met his burden of proof.

The examiner has correctly found that the results demonstrated in the Nonni patent and the declarations are

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expected. See In re Skoner, 517 F.2d 947, 949, 186 USPQ 80,
82 (CCPA 1975) (expected beneficial results are evidence of
obviousness just as unexpected results are evidence of
unobviousness). With respect to the synergistic results shown
in the Nonni patent, we direct attention to the above
discussion on claim 29 which recites such a limitation. In
addition, we provide below the examiner's factual
findings (Answer, page 21) for convenience:

FARLEY teaches EOP bleaching and teaches that
simultaneous bleaching with oxygen and peroxide
"permits the duration of exposure of the cellulose
to oxygen is decreased with decrease in the
depolymerization of the cellulose for attaining of
any given improvement in brightness" and "it permits
superior bleaching" (column 1, line 64-column 2,
line 14). The same decrease in the exposure of
oxygen would be expected when the oxygen of
LIEBERGOTT ET AL is used simultaneously with the
peroxide as taught by FARLEY. Such decreased
exposure of the cellulose to oxygen would occur
whether the lignins were chlorinated or not. Thus,
the synergistic superior brightness and viscosity
results taught by FARLEY would have been expected in
a combined o [oxygen] and p [peroxide] extraction of
LIEBERGOTT ET AL.

With respect to the improved results in the declarations,
appellant has not demonstrated that they are unexpected. As
is well known and is confirmed by appellant in his own

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declarations, pre-bleached (chlorinated) kraft pulps have greater brightness than untreated kraft pulps. See also Kirk-Othmer which indicates that chlorine is a known bleaching agent. This difference in brightness would have been reasonably expected to be maintained even after the first alkaline extraction. In other words, the examiner has correctly found that kraft pulps treated with a multi-stage bleaching process, such as one described by the Liebergott reference, would be expected to have greater brightness than those treated with a single stage bleaching process. See Answer, pages 21 and 22. When kraft pulps are already pre-bleached (chlorinated) as required by the claims and by the Liebergott reference, less oxygen (depolymerizing agent) and bleaching time (depolymerizing time) than those required by untreated kraft pulps are expected to be required to produce kraft pulps having comparable brightness levels. Decreasing "the duration of exposure of the cellulose to oxygen" decreases "the depolymerization of the cellulose [minimizing the decrease in viscosity]" . See Farley, column 1, line 71 to column 2, line 2. Consequently, the use of chlorinated

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(pre-bleached) kraft pulps would have expectedly improved pulp strength (less reduction in viscosity) at comparable brightness levels. Note also the

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examiner's discussion on the deficiencies on appellant's measurement of improvement regarding brightness and viscosity. See Answer, pages 24-26.

Further, we find that that "simultaneous" introduction of oxygen and an other oxidizing agent, such as a peroxide, to chlorinated kraft pulps at the start of the caustic extraction, as opposed to the delayed addition of oxygen and an other oxidizing agent, would be reasonably expected to yield improved pulp strength and brightness. As indicated supra, one having ordinary skill in the art would have had a reasonable expectation of maximizing the synergistic results described in the Farley reference by exposing the pulps to both oxygen and a peroxide immediately before or at the start of the extraction-oxidation reaction since any delay in adding any one of the oxidizing agents would have delayed the desired synergistic extraction-oxidation action. In this regard, we note that the Farley reference already teaches adding oxidizing agents immediately before or at the start of the extraction-oxidation reaction.

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Appellant also takes the position that the claimed subject matter is a commercial success. See, e.g., Brief, page 78. In support of his position, appellant refers to the showing in the Renard declarations executed on November 19, 1991 (filed November 25, 1991) and on November 18, 1992. See, e.g., Brief, pages 78-82. The Renard declarations relate to the implementation and operation of Eo+p (the first alkaline extraction stage employing oxygen and hydrogen peroxide) in many of International Paper Company's (IPC) bleaching lines in the United States and foreign countries. See the Renard November 19, 1991 declaration, paragraphs 4 and 5 and the Renard November 18, 1992 declaration, paragraphs 3 and 5. The Renard declarations then discuss the amount of bleached pulp produced by these bleaching lines. See the Renard November 18, 1992 declaration, paragraphs 5 through 7. The amount of bleached pulp produced by these bleaching lines in 1991 appears to constitute about 5.5% (8.7% x 66%) of the total quantity of bleached kraft pulp produced and sold annually by the paper mill industry in the United States. According to the Renard declarations,

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[a]lthough IPC presently consumes most of its own bleached kraft pulp production in its own paper mills, the approximate market value of such pulp produced by IPC in fiscal (calendar) year 1991 using the Nonni process of the '420 patent (as set forth in paragraph 4 above) is approximately 1.5 billion dollars U.S. . . . See the Renard November 18, 1992 declaration, paragraph 8.

The Renard declarations also indicate that IPC granted an exclusive license to practice Eo+p process covered by the Nanni patent to E.I. Dupont de Nemours Co., Wilmington, Delaware (hereinafter referred to as "Dupont"). See the Renard November 19, 1991 declaration, paragraph 7. At the request of Dupont, IPC converted the exclusive license to non-exclusive status in 1992. See the Renard November 18, 1992 declaration, paragraph 9, together with the Dupont letter indicating customers' refusal to pay royalties. Due to the terms of the license agreement, IPC does not know the identity of any sublicensees or "the manner in which the process being practiced or the quantity of pulp being processed in accordance with the Nonni process." However, it is said that "IPC has been informed that Dupont has granted licenses to third parties to practice the Nonni process covered by the '420 patent (including any reissues thereof)." See the Renard

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November 18, 1992 declaration, paragraph 10. According to the Renard declarations (the Renard November 18, 1992 declaration, paragraph 4, and the Renard November 19, 1991 declaration, paragraph 6), the installation of Eo+p provides several economic, ecological and technical benefits including:

a. reduction in the quantity of chlorine or chlorine dioxide required for delignification and bleaching;

b. reduction in environmental burden by virtue of reduced chlorine usage; and,

c. enabling production of pulp having higher brightness without sacrificing pulp strength (viscosity).

Upon carefully reviewing the Renard declarations, we do not believe that appellant has met his burden of establishing a prima facie case of nexus between the purported commercial success and the merits of the claimed invention. See Demaco Corp. v. F. Von Langdorff Licensing Ltd., 851 F.2d 1387, 1392-93, 7 USPQ2d 1222, 1226 (Fed. Cir.), cert. denied, 488 U.S. 956 (1988); Cable Elec. Prods., v. Genmark, Inc., 770 F.2d 1015, 1026-27, 226 USPQ 881, 887-88 (Fed. Cir. 1985). On this record, the Renard declarations do not provide sufficient information to establish that the claimed subject matter is

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commercially successful.

We initially observe that appellant does not provide sufficient information upon which the examiner could conclude that the claimed subject matter is commercially successful. There is nothing in the Renard declarations to indicate (1) the growth of the market share other than implementation of the Eo+p stage on the patent owner's own bleaching lines; (2) the extent to which the market has abandoned other processes in favor of the appellant's process; or (3) the extent to which profitability has increased since the implementation of the Eo+p stage. The market value of the pulps produced is not said to be any different from those produced under the existing technology. The licensing agreement referred to by appellant does not indicate how widely the claimed invention is used.

Even assuming that the Renard declarations had sufficiently demonstrated commercial success, we cannot determine that the purported commercial success is due to the claimed invention (i.e., the evidence of commercial success must be commensurate in scope with the claims which the

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evidence is offered to support). Joy Technologies Inc. v. Manbeck, 751 F. Supp. 225, 231, 17 USPQ2d 1257, 1260-61 (D.D.C. 1990), aff'd, 959 F.2d 226, 229, 22 USPQ2d 1153, 1156 (Fed. Cir.), cert. denied, 506 U.S. 829 (1992). As indicated by appellant, the Renard declarations indicate that the Eo+p stage (extraction-oxygen and peroxide oxidation reaction) was implemented in many of the patent owner's (IPC) own bleaching lines. However, they do not attribute such result to the claimed invention. Nowhere do the Renard declarations indicate that a combination of chlorination and Eo+p, or a combination of oxygen, chlorination and Eo+p, was implemented in the patent owner's bleaching lines. Nor does the licensing agreement indicate what was implemented by sublicensees. The Nonni patent referred to in the licensing agreement includes subject matter that is outside of the presently claimed subject matter.⁷

Even assuming the Renard declarations' conclusory assertions are sufficient to show the nexus between the

⁷The original Nonni patent includes many processes which are outside of the presently claimed subject matter.

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purported commercial success and the claimed invention, we do not find such showing to be dispositive of unobviousness.

Here, as acknowledged in the Renard declarations, the reasons for implementing the Eo+p stage is attributed to the advantages which are already recognized in the applied prior art as indicated supra. When, as here, the applied prior art mentions various economic, ecological and technical benefits for using the Eo+p stage, i.e, improvement of pulps' brightness and strength (viscosity), as well as the reduction of the pollution emission and chlorine consumption associated with conventional multi-stage bleaching and delignification processes, it would be expected that the Eo+p stage would appeal to those who operate paper mills (bleaching lines), thus resulting in its implementation in many bleaching lines. Compare Skoner, 517 F.2d at 949, 186 USPQ at 82 (expected beneficial results are evidence of obviousness).

Having considered all the evidence and arguments anew, we conclude that, on balance, the evidence and arguments presented by appellant taken as a whole do not outweigh the evidence of obviousness established by the examiner. See

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Newell Cos. v. Kenney Mfg. Co., 864 F.2d 757, 768, 9 USPQ2d
1417, 1426 (Fed. Cir. 1988), cert. denied, 493 U.S. 814
(1989); In re Beattie, 974 F.2d 1309, 1313, 24 USPQ2d 1040,
1043 (Fed. Cir. 1992). Accordingly, we affirm the examiner's
decision rejecting claims 11 through 25 and 27 through 30.

Non-art rejections

Nonenablement

The test for enablement is whether one of ordinary skill
in the art could make and use the claimed invention from the
disclosure in the specification coupled with information known
in the art without undue experimentation. United States v.
Telectronics, Inc., 857 F.2d 778, 785, 8 USPQ2d 1217, 1222-23
(Fed. Cir. 1988), cert. denied, 490 U.S. 1046 (1989); In re
Stephens, 529 F.2d 1343, 1345, 188 USPQ 659, 661 (CCPA 1976).
The examiner has the initial burden of supplying a reasonable
basis to question the adequacy of appellant's presumptively
correct disclosure. In re Marzocchi, 439 F.2d 220, 224, 169
USPQ 367, 370 (CCPA 1971). Once this is done, the burden
shifts to appellant to rebut this conclusion by presenting
evidence to prove that the disclosure is enabling. In re

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Doyle, 482 F.2d 1385, 1392, 179 USPQ 227, 232 (CCPA 1973),
cert. denied, 416 U.S. 935 (1974), and In re Eynde, 480 F.2d
1364, 1370, 178 USPQ 470, 474 (CCPA 1973).

Here, the examiner has rejected claim 28 as it is not supported by an enabling disclosure. In so rejecting, the examiner fails to take into account information known in the art (the Farley reference) together with the disclosure of the Nonni patent. As indicated by appellant (Brief, page 93), the paragraph spanning lines 38-45 in column 2 of the Nonni patent states that:

The process of the present invention has a number of advantages over the practices of the prior art. It provides additional delignification and brightening in an extraction stage beyond that attainable by either $C_D(hE)$, $C_D(pE)$ or $C_D E_0$ alone and, most unexpectedly, without any additional loss in viscosity beyond that obtained when using any of the foregoing sequences at comparable permanganate numbers.

These advantages are obtained by

adding a hypochlorite or a peroxide together with oxygen during the first alkaline extraction stage with caustic of a multi-stage bleaching and delignification process, or by adding a hypochlorite or a peroxide directly to the pulp immediately prior to the first alkaline extraction stage with caustic and oxygen in a multi-stage bleaching and delignification process. (see column 2, lines

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23-30).

This disclosure is consistent with the very teachings in the Farley reference which the examiner relied on to establish obviousness. In view of the examiner's own finding regarding the Farley reference, we do not believe that it can seriously be contended that one of ordinary skill in this art would not know how to make and use the claimed invention without undue experimentation. Accordingly, we reverse the examiner's decision rejecting claim 29 under the first paragraph of 35 U.S.C. § 112.

Indefiniteness

The purpose of the second paragraph of Section 112 is to basically insure, with a reasonable degree of particularity, an adequate notification of the metes and bounds of what is being claimed. See In re Hammack, 427 F.2d 1378, 1382, 166 USPQ 204, 208 (CCPA 1970). When viewed in light of this authority, we cannot agree with the examiner that the metes and bounds of claim 29 cannot be determined because of the list of alleged deficiencies noted by the examiner. As the court stated in In re Moore, 439 F.2d 1232, 1235, 169 USPQ

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236, 238 (CCPA 1971), the determination of whether the claims of an application satisfy the requirements of the second paragraph of Section 112 is

merely to determine whether the claims do, in fact, set out and circumscribe a particular area with a reasonable degree of precision and particularity. It is here where the definiteness of language employed must be analyzed -- not in a vacuum, but always in light of the teachings of the prior art and of the particular application disclosure as it would be interpreted by one possessing the ordinary level of skill in the pertinent art. [Emphasis ours; footnote omitted.]

Here, the examiner has rejected claim 29 as being indefinite. The examiner takes the position that:

The term "extracting the chlorinated pulp with caustic in the presence of from about 0.2 to about 1.0% oxygen, based on the oven-dry weight of the pulp, and . . . from about 0.05% to about 1.0% of a peroxide, based on the oven-dry weight of the pulp in a first alkaline extraction stage and whereby additional delignification and bleaching is provided in such extraction stage beyond that attainable using either C_p(hE), C_p(pE) or C_pE₀ alone and without loss in viscosity beyond that obtained when using any such sequence at comparable permanganate numbers" is indefinite as it is not clear if the "permanganate numbers" are the original "permanganate numbers" of the starting kraft pulps or the "permanganate numbers" for the bleached pulps, e.g. after the final bleach stage. Also this term contradicts the Examples in the specification. TABLE 6 shows the viscosity for the CD(pE₀) sequence to be lower than all the other bleach sequences,

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i.e. lower than for the $C_D(hE)$, $C_D(pE)$ and C_DE_0 sequences. TABLES 1, 2 and 5 show the viscosity for the $CD(hE_0)$ to the lower (not "without loss in viscosity" as claimed) than for the $CD(hE)$ bleach sequence. Also " $C_D(pE)$ " should be rewritten " $C_D(pE)$ ", i.e. without a space between the " C_D " and " (pE) ". Also these sequences ($C_D(hE)$, $C_D(pE)$ and C_DE_0), are indefinite as it is not clear if these bleach sequences are open (e.g. can include other bleaching stages) or closed. It is not clear if washing stages occur between the various stages, it is not clear if the stages between the brackets are sequential or simultaneous.

We do not find the examiner's position to be reasonable for the reasons set forth at pages 96, 97 and 98 of the Brief. We shall adopt appellant's reasons in the Brief as our own. Accordingly, we reverse the examiner's decision rejecting claim 29 under the second paragraph of 35 U.S.C. § 112.

In conclusion,

(1) the prior art rejections of the claims on appeal under 35 U.S.C. § 103 are affirmed; and

(6) the non-art rejections of claim 29 under 35 U.S.C. § 112, first and second paragraphs, are reversed.

Accordingly, the decision of the examiner is affirmed.

Further proceedings in this case may be taken in accordance with 35 U.S.C. §§ 141 to 145 and 306, and 37 CFR §§

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1.301 to 1.304. Note also 37 CFR § 1.197(b). If the patent owner fails to continue prosecution, the reexamination and reissue proceedings will be terminated and, with respect to the reexamination proceeding, a certificate under 35 U.S.C. § 307 and 37 CFR § 1.570 will be issued canceling the patent claims, the rejection of which has been affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a). See the final rule notice, 54 F.R. 29548 (July 13, 1989), 1105 O.G. 5 (August 1, 1989).

AFFIRMED

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)	
)	
)	BOARD OF PATENT
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Administrative Patent Judge)	APPEALS AND
)	
)	INTERFERENCES
)	
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Administrative Patent Judge)	

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