FINNISH PATENT AND REGISTRATION OFFICE

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Patent application details
Application number 20195550

Applicant's name
Kemira Oyj

Representative
ESPATENT OY

Your reference
32369FI-1f

Application rejected

Summary

The technical content of independent claims 1, 17 and 27 neither is novel nor involves an inventive step. Furthermore, none of dependent claims 2 - 15, 18 - 26 are novel or involve an inventive step, and dependent claim 16 does not involve an inventive step. Therefore, the claims cannot be accepted (section 2 of the Patents Act).

The grounds for rejection have been set out in our earlier office actions and you have had an opportunity to respond. Your replies cannot be accepted.

The application must be rejected under section 2 of the Finnish Patents Act.

Application documents constituting the basis for this decision

This decision is based on application documents that have arrived at the PRH on the following dates:

- claims (in English) 02 June 2022
- description 20 June 2019
- drawings 13 November 2020
- your replies 13 November 2020, 02 June 2022 and 28 August 2023.

Subject matter of claims

Independent claim 1 defines

(a) a method for estimating and/or predicting a runnability risk level and/or end product quality risk level for a pulp, board or papermaking process, the method comprising

(b) providing samples from at least one aqueous stream of the pulp, board or papermaking process;
(c) measuring hydrophobicity values of at least two samples originating from the same aqueous stream of the pulp, board or papermaking process;
(d) producing a hydrophobicity measurement signal of measured hydrophobicity values as a function of time for said at least one aqueous stream;
(e.1) processing said hydrophobicity measurement signal to calculate a runnability risk level and/or end product quality risk level for the pulp, board or papermaking process, wherein the processing comprises calculating at least one mathematical index, based at least
(e.2) on the hydrophobicity measurement signal produced for said at least one aqueous stream, and
(e.3) optionally on the amount of particles in said at least one aqueous stream as a function of time, other property of said at least one aqueous stream as a function of time and/or production data as a function of time,
(e.4) wherein the calculated mathematical index and optionally the amount of the particles in said at least one aqueous stream as a function of time, other property of said at least one aqueous stream as a function of time and/or production data as a function of time is used as a risk indicator input in the calculation of the runnability risk level and/or end product quality risk level; and
(f) based on the runnability risk level and/or end product quality risk level calculated for the pulp, board or papermaking process, indicating the runnability risk level and/or the end product quality risk level for the pulp, board or papermaking process.

Independent claim 17 defines an apparatus that comprises means for performing steps (a) - (f).

Independent claim 27 defines use of the method according to any of claims 1 - 16 or the apparatus according to any of claims 17 - 26 in monitoring and controlling of chemical performance in the pulp, board or papermaking process.

Dependent claims 2 - 16 and 18 - 26 define further details of the method and apparatus of independent claims 1 and 17.

Cited documents

This decision is based on the following documents, which have been cited in the office actions:

D1: FI 20136172 A
D2: WO 2019002699 A1

D3: US 2009084510 A1
D4: US 2019153675 A1.

Processing steps, applicant's replies and examiners' comments

In the first office action issued on 18 February 2020, the original independent claims 1, 17 and 27 were found to lack both novelty and inventive step over any of documents D1 - D4. Original independent claims 2 and 18 were found to lack both novelty and inventive step over either of documents D1 - D2 and inventive step over either of documents D3 - D4. Dependent claims 3 - 16, 19 - 26 were found to lack novelty and inventive step over the prior art. The PRH noted that the mathematical features cited in dependent claims 8 - 9, 16 and 19 - 20 were nontechnical and, therefore, they are not taken into account in the assessment of novelty and inventive step (cf. current Patenttikäsikirja, January 2024, section E.6, basic case 2; section E.3.1, paragraph 3; section E.4.2; EPO board of appeal decisions G 2/88, T 154/04, T 641/00; EPO Guidelines, section G-VII, 5.4). Dependent claims 4, 16 and 22 were considered unclear.

Along with a reply dated 13 November 2020, you filed a claim set where independent claims 1, 17 and 27 were not amended but original independent claims 2 and 18 were made dependent on claims 1 and 17. You argued that the invention differs from the cited prior art in that the present invention is a predictive system/method, while the cited prior art merely disclose real time solutions. You did not comment on any of documents D1 - D4 in detail.

In the second office action issued on 02 November 2021, the PRH noted that you had failed to address the clarity objections presented in the previous office action and failed to perform detailed feature comparisons between documents D1 - D4 and the claims. Your suggestion that the invention would differ from the prior art by being a predictive system/method was considered irrelevant because independent claims 1, 17, 27 and dependent claims 2 - 9, 11 - 16, 18 - 20, 22 - 26 comprise embodiments where no prediction is performed. Furthermore, your suggestion was considered incorrect because prediction could be found in each of documents D1 - D4. The PRH saw no reason to deviate from the assessments of novelty, inventive step and clarity presented in the previous office action.

Along with a reply dated 02 June 2022, you filed the present claim set where dependent claims 4, 16 and 22 had been amended in order to address the clarity issues raised in the previous office actions. A clerical error in dependent claim 18 was also corrected. You argued that none of documents D1 - D4 would disclose a combination of features (c) and (d) of independent claim 1 which according to your interpretation states that a single measurement signal is produced for multiple samples which measurement signal

is then prosessed as described in claim 1 to calculate the runnability risk level and/or end product quality risk level for the pulp, board or papermaking process.

In the third office action issued on 26 May 2023, the PRH repeated the observations on nontechnical features presented in the first office action and also noted that no functional form is presented for the mathematical index defined in features (e.1), (e.4) of independent claims 1, 17, 27, and no details regarding the calculation of the runnability and/or end product quality risk level are presented. The mathematical index thus remains a purely mathematical intermediate variable with no technical content. The technical content of features (e.1), (e.4) reduces to calculating the runnability and/or end product quality risk level based on the hydrophobicity measurement signal of feature (e.2) and optionally the variables of feature (e.3). In the analysis of novelty, the PRH particularly pointed out how each of documents D1 - D4 discloses variables that indicate a runnability and/or end product quality risk level in accordance with features (e) - (f). In view of the fact that the mathematical index in features (e.1), (e.4) has no technical content, and even the intended content according dependent claims 4 - 5 and the description only comprises hydrophobicity values, the conclusion was that each of documents D1 - D4 discloses the technical content of features (e) - (f). The PRH found your argument regarding the combination of features (c) and (d) unacceptable because each of documents D1 - D4 discloses embodiments where a sample is measured and processed repeatedly at successive time instants in order to determine a runnability and/or end product quality risk level. Furthemore, claims 1, 17 and 27 are not limited to embodiments where the calculation of the mathematical index and risk levels would be based on hydrophobicity sample measurements corresponding to two or more time instants. In accordance with the previous office actions, the technical content of independent claims 1, 17 and 27 was found to lack both novelty and inventive step over any of documents D1 - D4. Dependent claims 2 - 15 and 18 - 26 were found to lack novelty and inventive step over the prior art. Dependent claim 16 was considered novel but obvious to a person skilled in the art in the context of any of documents D1 - D4. Dependent claims 4, 16 and 22 were now considered clear.

In your reply dated 28 August 2023, you have not amended the claims. You have argued that none of documents D1 - D4 discloses calculating a risk level, and a variable possibly indicating a risk level is not a same thing as actually calculating a risk level. Furthermore, you have argued that the mathematical index calculated based on the hydrophobicity measurement signal contributes to the technical effect of the claims serving a technical purpose, and thereby the mathematical index contributes to the technical character of the invention. Therefore, the mathematical index feature should be given weight in the novelty and inventive step analysis.

As regards your latest reply, the PRH makes the following observations:

- In the assessment of novelty and inventive step, only the technical content and scope of terms such as "calculating a risk level" and "mathematical index" are relevant. The question is thus not whether the words "risk level" or "mathematical index" can be found in the reference documents, neither are the claims limited to the embodiments presented in figures 3 - 5. Calculating a variable that indicates a risk level falls within the scope of calculating a risk level. Needless to say, no quantification of risk levels has been defined in the claims.
- You have not specified what is the contribution of the mathematical index to producing a technical effect in the context of the claims. As it has been noted in the previous office action, an intermediate variable with no functional form and no well-defined role in the calculation of the runnability and/or end product quality risk level has no technical effect.

Grounds for rejection

Novelty (section 2 of the Finnish Patents Act)

Independent claims

The following observations have essentially been made in the office actions issued on 18 February 2020, 02 November 2021 and 26 May 2023.

Document D1

Document D1 discloses all the features (a) - (f) of independent claims 1 and 17 as follows:

(a): page 8, line 23 - page 9, line 6; page 10, lines 1 - 5; page 11, lines 10 - 30. Associating hydrophobicity measurements in the wet end of a paper machine with running problems involves prediction for the simple reason that the wet end represents an earlier process stage with respect to the later stages. It is thus implicit that an agglomeration of hydrophobic particles observed in the wet end at one time instant corresponds to running problems at another, later time instant. Therefore, the use of key variables such as hydrophobicity in D1 for monitoring the running parameters and properties of a paper machine implies that the key variables are used as predictors for the running parameters and properties.
(b): abstract; page 5, lines 21 - 28
(c) - (d): page 1, lines 8 - 9; page 4, lines 1 - 4; page 8, lines 9 - 22; page 9, lines 2 - 6, 11 - 16, 23 - 26; page 10, lines 10 - 28; page 11, lines 10 - 15; figures 5, 7. In light of the description of the present application, features (c) - (d) comprise embodiments

where a sample is taken from a chosen aqueous stream repeatedly at successive time instants. D1 discloses embodiments where a sample is measured and processed repeatedly at successive time instants in order to determine a runnability and/or end product quality risk level. Online measurements are performed, e.g., white water samples are taken every 30 minutes. It is also mentioned that total hydrophobicity and total count are derived from the whole signal of fractionated samples. D1 thus discloses runnability and/or end product quality risk analyses based on a plurality of sample fractions which can also be considered separate samples.
(e.1), (e.2), (e.4): page 9, lines 7 - 26; page 10, lines 1 - 5; page 11, lines 10 - 30. The counts and hydrophobicity of particle populations, especially agglomerates, are interpreted as indicators of a runnability risk level and/or end product quality risk level for the pulp, board or papermaking process. The mathematical index in features (e.1), (e.4) is an intermediate variable with no technical content, and even the intended content according dependent claims 4 - 5 and the description (page 4, lines 13 - 22) only comprises hydrophobicity values. Therefore, in view of what the PRH has said about claims 4 - 5 in the office actions, cumulative sums, averages, means, maxima and minima of hydrophobicity signals could also be considered mathematical indices in D1, and total hydrophobicity is derived from these indices.
(e.3): page 10, lines 1 - 5; page 11, lines 10 - 30. Counts of particle populations are taken into account in the analysis of running problems (e.g., paper defects).
(f): page 10, lines 1 - 5; page 11, lines 10 - 30. It is implicitly clear that the counts and hydrophobicity of particle populations are indicated.

Although feature (e.3) has been included in the analysis above, it is noted that this feature is optional and does not limit the scope of claims 1, 17 and 27. Similar observations apply to feature (e.4) to the extent that is refers to variables listed in feature (e.3).

It follows from these observations that the subject matter of independent claims 1, 17 and 27 lacks novelty over document D1.

Document D2

Document D2 discloses a hydrophobic particle monitoring method and system similar to document D1. Hydrophobicity of fractionated samples or filtrates of a pulp suspension is measured as a function of time in order to determine the amount of acetone soluble material in the pulp (see especially page 6, lines 17 - 21). Since the amount of hydrophobic (acetone soluble) material correlates with pulp quality with regard e.g. to runnability on a paper machine (see page 7, lines 19 - 32; page 10, line 34 - page 11, line 15; page 12, line 4 - page 13, line 16; figures 1, 4, 5), the percentages of

hydrophobic particles are identified as indicators of a runnability risk level and/or end product quality risk level for the pulp, board or papermaking process in accordance with features (e) - (f).

As regards feature (a), the fact that the process is monitored and controlled at an early stage on the basis of hydrophobicity measurements, i.e., before any runnability or pulp quality issues have been detected implies that the hydrophobicity measurements are used as predictors for runnability and end product quality risk levels for pulp, board or papermaking processes (see page 3, line 33 - page 4, line 7; page 4, line 30 - page 5, line 6; page 7, lines 19 - 32; page 9, lines 3 - 13; page 10, line 34 - page 11, line 15; page 13, lines 7 - 9).

As regards the combination of features (b) - (d), D2 discloses embodiments where a sample is measured and processed repeatedly at successive time instants in order to determine a runnability and/or end product quality risk level. Online measurements are preformed, e.g., on a pre-set, intermittent and/or continuous basis (see page 5, lines 15 - 17; page 6, lines 17 - 21; page 7, lines 23 - 32; page 9, lines 3 - 17; page 10, lines 10 - 13; page 12, line 29 - page 13, line 16; claim 10). It is also explicitly mentioned that the measurement and/or calculation of a fluorescence integral may be performed based on one or more samples (see page 9, lines 14 - 35).

It follows from these observations and the nontechnical character of the intermediate mathematical index that the technical content of independent claims 1, 17 and 27 lacks novelty over document D2.

Document D3

Document D3 discloses a method for determining the number of organic contaminants such as microstickies as a function of time in pulp samples, filtrates, water-based samples etc. The determination is made by measuring the hydrophobicity of microstickies after they have been stained with a hydrophobic dye (see the most relevant parts of D3 listed earlier, especially paragraphs [0035], [0038], [0052] - [0054], [0073]; figures 2 - 3). Since the microstickies counts correlate with paper machine outbreaks (see paragraphs [0009], [0064] - [0065], [0083] - [0092]), the microstickies counts are identified as indicators of a runnability risk level and/or end product quality risk level for the pulp, board or papermaking process in accordance with features (e) - (f).

As regards feature (a), prediction of runnability or end product quality risk levels on the basis of hydrophobicity measurements is mentioned explicitly in D3 (see paragraphs [0065], [0083] - [0092]).

As regards the combination of features (b) - (d), D3 discloses embodiments where a sample is measured and processed repeatedly at successive time instants in order to determine a runnability and/or end product quality risk level (see paragraphs [0021], [0035], [0073], [0083], [0098]; figures 2 - 3).

It follows from these observations and the nontechnical character of the intermediate mathematical index that the technical content of independent claims 1, 17 and 27 lacks novelty over document D3.

Document D4

Document D4 discloses a method for quantifying the amount of hydrophobic contaminants as a function of time (see paragraph [0051]) in filtrates of aqueous paper mill samples. Since the number of spherical hydrophobic particles correlates with the number of holes or other print defects in a paper sample (see paragraphs [0003] - [0004], [0029] - [0032], [0071] - [0076]), this number is identified as an indicator of a runnability risk level and/or end product quality risk level for the pulp, board or papermaking process in accordance with features (e) - (f).

As regards feature (a), the process is monitored and controlled in D4 at an early stage on the basis of the number of spherical hydrophobic particles before any holes or other print defects have been detected (see paragraphs [0029] - [0035], [0052], [0054] - [0057], [0071] - [0076]). Therefore, the hydrophobicity measurements are used as predictors for runnability and end product quality risk levels for pulp, board or papermaking processes.

As regards the combination of features (b) - (d), D4 discloses embodiments where a sample is measured and processed repeatedly at successive time instants in order to determine a runnability and/or end product quality risk. Real-time imaging and checking of trends is mentioned in paragraphs [0048], [0063] but continuous sampling and analysis is also implicit in optimisation and control of a papermaking process (see, e.g., paragraphs [0018], [0027] - [0029], [0032] - [0035], [0039], [0055], [0057], [0071] - [0072]).

It follows from these observations and the nontechnical character of the intermediate mathematical index that the technical content of independent claims 1, 17 and 27 lacks novelty over document D4.

Dependent claims

The following observations have been made in the office actions:

- Claims 2, 6 and 18 lack novelty over either of documents D1 - D2.
- Claim 3 lacks novelty over any of documents D1 - D3.
- Claims 4 - 5 lack novelty over document D1.
- Claims 7, 10 - 12 and 21 - 23 lack novelty over any of documents D1 - D4.
- The technical content of claims 8 - 9 and 19 - 20 lacks novelty over any of documents D1 - D4.
- Claims 13 - 15 and 24 - 26 lack novelty over document D2.

Inventive step (section 2 of the Finnish Patents Act)

Independent claims

Since the subject matter of independent claims 1, 17 and 27 lacks novelty, it does not involve an inventive step, either.

Dependent claims

Since the subject matter of claims 2 - 15 and 18 - 26 lacks novelty, it does not involve an inventive step, either.

The following observations have also been made in the office actions:

- Claims 2, 6 and 18 lack an inventive step over either of documents D3 - D4.
- Claim 3 lacks an inventive step over document D4.
- Claims 4 - 5 lack an inventive step over any of documents D2 - D4.
- Claims 13 - 15 and 24 - 26 lack an inventive step over any of documents D1, D3 or D4.
- Claim 16 lacks an inventive step over any of documents D1 - D4.

Conclusions

It has been argued in the previous office actions that the technical content of independent claims 1, 17 and 27 lacks both novelty and inventive step over any of documents D1 - D4. You have not amended the independent claims during the prosecution of the application. Since the novelty and obviousness assessments presented in the previous office action are still considered valid and you have not

presented relevant new counterarguments, there is no reason to issue a further office action. Accordingly, the application must be rejected (section 16 of the Patents Act).

Appeal

You may lodge an appeal with the Finnish Market Court within 60 days after you were notified of the decision. We enclose our appeal instructions. Appeals are subject to a fee.

FINNISH PATENT AND REGISTRATION OFFICE

Heidi Kuismanen
Principal Patent Examiner

Antti Salmela
Principal Patent Examiner

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This document has been electronically signed.

Enclosed documents

[redacted]