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D E C I S I O N
of 8 February 1995

Case Number: T 0856/92 - 3.4.2

Application Number: 82305873.0

Publication Number: 0079726

IPC: G01N 13/00, G10N 33/34, G01N 27/07

Language of the proceedings: EN

Title of invention:
Apparatus for determining an electrical characteristic of a fibrous dispersion

Patentee:
The Wiggins Teape Group Limited

Opponent:
Paper Chemistry Laboratory, Inc.

Headword:
-

Relevant legal provisions:
EPC Art. 56, 113(1), 123(2)

Keyword:
"Examination of claims not under appeal (no)"
"Inventive step - (yes) after amendment"
"Absence of the Respondent at oral proceedings - amendments to claims (allowable)"

Decisions cited:
G 0009/92, G 0004/92, T 0202/92

Catchword:
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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0856/92 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 8 February 1995

Appellant: (Proprietor of the patent)
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Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office dated 8 July 1992 concerning maintenance of European patent No. 0 079 726 in amended form.**

Composition of the Board:

Chairman: E. Turrini
Members: W. W. G. Hofmann
B. J. Schachenmann

Summary of Facts and Submissions

I. The Appellant (Proprietor of the patent) lodged an appeal against the interlocutory decision of the Opposition Division on the amended form in which the patent No. 0 079 726 (application No. 82 305 873.0) could be maintained.

Opposition had been filed by the Respondent (Opponent) against the patent as a whole and based on Article 100(a) EPC, having regard to the following documents

(D1) US-A-3 186 215
(D2) US-A-3 538 749
(D3) Acta Polymerica 31 (1980), Heft 8, 510-517
(D4) Acta Polymerica 31 (1980), Heft 8, 504-509.

The further prepublished document

(D5) Das Papier 30 (1976) 10A, V42-V46,

already considered during the examination procedure, had also been cited by the Respondent.

II. After a communication of the Board of Appeal together with summons to oral proceedings, the Respondent notified the Board that he had decided not to attend the oral proceedings.

III. Oral proceedings were held in the absence of the Respondent, at the end of which proceedings the Appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis

of the Claims 1 to 11 submitted during the oral proceedings, with the description to be adapted and the drawings as granted.

The Respondent requested (in writing) that the patent be revoked and, as an auxiliary motion, that the patent be denied in any scope going beyond the scope held allowable by the Opposition Division.

IV. The wording of the independent Claims 1, 3 and 7 on file at the time of the present decision reads as follows:

"1. A measuring apparatus for use in the measurement of an electrical characteristic of a fibrous dispersion comprising a measuring cell (12) having a housing defining a hollow interior, first (18) and second (16) ports on opposite sides of said housing to allow fluid to be passed through the housing and a filter mesh (14) in the housing between said ports (16, 18) to divide the housing into two compartments so that fluid flows from one port to the other through the filter mesh (14), and a respective electrode (40, 42) in each compartment to measure streaming potential within the cell; and first (19A) and second (19B) conduit arrangements connected to said first (18) and second (16) ports respectively to introduce a particle-bearing stock to said first port (18) and flushing water to said second port (16); said cell (12) being oriented to have said filter mesh (14) essentially horizontally disposed with said first (18) and second (16) ports respectively below and above said filter mesh (14) to allow fluid to flow through the cell (12) in a generally vertical direction, said first conduit arrangement (19A) including respective connections for a source (30, 32) of particle bearing stock and drain and valve means (26, 28) for controlling the flow of fluid through these connections, and control means (140) being provided for controlling the valve

means and the measurement of streaming potential with the aid of said electrodes (40, 42), the control means being programmed to perform a measuring cycle in which stock enters the measuring cell (12) through the lower port (18) to build a pad of particles on the underside of the filter mesh (14), subsequent to the formation of the pad, a pulse of substantially constant pressure difference is applied across the pad, said pulse being shaped such that there is negligible accumulation of further particles to the pad, and a measurement of streaming potential is performed while said pressure pulse is applied, and the pad is subsequently flushed from the filter mesh (14) to drain through said lower port (18)."

"3. A method of obtaining a measure of streaming potential of a fibrous dispersion using a measuring cell (12) having a housing defining a hollow interior, first (18) and second (16) ports on opposite sides of said housing to allow fluid to be passed through the housing and a filter mesh (14) in the housing between said ports (16, 18) to divide the housing into compartments so that fluid flows from one port to the other through the filter mesh (14), and a respective electrode (40, 42) in each compartment to measure streaming potential within the cell, and using a pressure transducer (44) responsive to the pressure in the compartment leading to said first port (18), the method comprising introducing feed stock containing particulate material to said first port (18) to develop a pad of material on said filter mesh and measuring the pressure in the compartment leading to said first port (18) and the potential across said electrodes (40, 42), and then introducing flushing fluid to said second port (16) to remove said pad from the filter mesh (14):
characterised by

orienting the measuring cell (12) to have said filter mesh (14) essentially horizontally disposed with said first (18) and second (16) ports respectively below and above said filter mesh (14) to allow fluid to flow through the cell in a generally vertical direction, and characterised by performing the measurement method according to the following steps: (a) introducing the feed stock containing particulate material to said first port (18) so as to flow upwardly through the cell (12) and develop the pad on the underside of said filter mesh;
(b) applying a pressure pulse across said pad and measuring the streaming potential across said electrodes and the pressure in said lower compartment;
(c) reducing the pressure difference across the pad to substantially zero prior and/or subsequent to step (b), and measuring the streaming potential and pressure in the lower compartment at the or each occurrence of the substantially zero pressure; and determining the ratio of streaming potential to pressure in step (b) where the values in step (b) are taken relative to the values obtained in step (c)."

"7. A measuring cell for use in the measurement of an electrical characteristic of a fibrous dispersion comprising a housing defining a hollow interior, first (320) and second (316) ports on opposite sides of said housing to allow fluid to be passed through the housing, a filter mesh (14) in the housing between said ports (316, 320) to divide the housing into two compartments so that fluid flow from one port to the other is through the filter mesh (14) and a respective electrode (40, 42) in each compartment, characterised in that the housing has a structure designed for use in a position in which the filter mesh (14) is essentially horizontally disposed to have said first (320) and second (316) ports

below and above the filter mesh (14) respectively, said housing structure being characterised by:
an upper housing section (310) defining an interior frusto-conical surface (318) narrowing upwardly to said second port (316), a lower housing section (312) defining an interior frusto-conical surface (322) narrowing downwardly to said first port (320), an intermediate section (314) located between said lower (310) and upper (312) sections and comprising a carrier member (350) having an aperture (352) at which the filter mesh (14) is received, the carrier member (350) being mounted for sliding movement between a first position in which the filter mesh (14) is disposed between said upper (310) and lower (312) housing sections and a second position at which the filter mesh (14) is located to one side of said upper (310) and lower (312) housing sections, stop means (370, 369) limiting the sliding movement of said carrier member (350) to define said first and second positions, and respective sealing means (364, 366) acting between said carrier member (350) and said upper (310) and lower (312) housing sections to provide a sealed enclosure for the filter mesh (14) in said first position."

Claims 2, 4 to 6 and 8 to 11 are respectively dependent on Claims 1, 3 and 7.

V. The Appellant essentially argued as follows:

The amendments to Claim 1 are entirely within what the reader would understand from the originally filed application. There is no question that the amendments introduce features that are individually disclosed in the original specification, and also, relating to the combination of features contained in Claim 1, there is nothing in Claim 1 that the reader did not previously understand from the specification. Together with the

introductory part of the description, the description of Figure 1 teaches that a build-up of the plug during the measurement of the streaming potential should be avoided, that, therefore, the pad measurement should be separated from the pad formation and performed in such a way that no further particles are accumulated, and that arrangements for correspondingly controlling the cell operation must be provided.

Horizontal disposition of the filter mesh was not obvious since it was not easy to recognize that non-uniformity of the pad could cause a problem. Moreover, starting from D5, the idea of separating the streaming potential measurement from the pad formation was not suggested by any of the cited documents.

VI. The Respondent's arguments were essentially as follows:

The amendments to Claim 1 made after grant added subject-matter not originally disclosed since wherever in the original application the control means are disclosed, they are described as controlling a set of five specific valves and other components, in a predetermined sequence of operations (a) to (d). There was no suggestion that any of operations (a) to (d) could be altered or omitted.

D5 represents the most relevant prior art. There is nothing in D5 which could lead to the conclusion that the horizontal orientation of the cell was other than arbitrary. Advantages derived from choosing an orientation with a vertical cell (horizontal filter mesh) - as far as such advantages existed - would be entirely predictable. D3 shows that there is no technical prejudice in the art in favour of vertical orientation of the filter. Control means for controlling the operation of an industrial measuring apparatus in

accordance with a predetermined program are entirely conventional, and no unforeseen advantages arise from their combination with a horizontal filter mesh. Examples of such control means are disclosed in D1 and D2. D1 and D2 belong to the same technical field as the patent in suit since they also relate to measurements of properties of fibrous dispersions in the paper making process and the apparatuses described therein are similarly constructed and are produced by the same companies and individuals as apparatuses for measuring streaming potential. The operating sequence as set out in steps (a) to (c) of the method claim is merely a practical realisation of a method for taking the two potential measurements as closely together as possible, and a person skilled in the art would adopt such a sequence in a commercial realisation of the instrument according to D5.

Reasons for the Decision

1. The appeal is admissible.

2. The independent Claims 3 and 7 together with dependent Claims 4 to 6 and 8 to 11 essentially correspond to the set of Claims 1 to 9 (auxiliary request) on the basis of which the Opposition Division has decided to maintain the patent in amended form. Since no appeal was filed against the maintenance of these claims (the Proprietor of the patent is the sole Appellant), neither the Board nor the Opponent may challenge the maintenance of the patent on the basis of these claims (see decision of the Enlarged Board of Appeal G 9/92, OJ EPO 94, 875; in particular first paragraph of the headnote). No comment is therefore required with respect to these claims.

3. *Claims 1 and 2, allowability of the amendments*

Claim 1 is based on the original Claim 1 and contains the additional features that control means are provided for controlling the valve means and the measurement of streaming potential with the aid of the electrodes, and that these control means are programmed to perform a measuring cycle in which stock enters the measuring cell through the lower port to build a pad of particles on the underside of the filter mesh subsequent to the formation of the pad, a pulse of substantially constant pressure difference is applied across the pad, said pulse being shaped such that there is negligible accumulation of further particles to the pad, a measurement of streaming potential is performed while said pressure pulse is applied, and the pad is subsequently flushed from the filter mesh to drain through the lower port.

There is no controversy about the fact that a control circuit controlling the valves and the measurement is disclosed in the application as filed (see eg reference number 140 in Figure 1; page 10, lines 17/18 and page 14, lines 13 to 19). It is also undisputed that a pad of particles is built on the underside of the filter mesh, subsequently a pulse of substantially constant pressure difference causing negligible accumulation of further particles is applied across the pad while a measurement of streaming potential is made (eg page 8, line 35; page 9, line 33 to page 10, line 5; page 21, lines 13, 16, 21 and 31/32), and subsequently the pad is flushed from the filter mesh (eg page 9, lines 28 to 32). However, the Respondent argues that the control means and their operation leading to the above events are only disclosed (see original Claim 11) in the context of specific operations of specific valves and in particular only for a cycle including a low pressure

reference condition (between steps (a) and (b) and/or between steps (b) and (c)), which further features are not included in the present Claim 1.

There is no simple rule indicating which combinations of features can, and which cannot, be considered as independently disclosed. Certainly, the whole of the content of the original application has to be taken into account, and each case has to be individually checked as to the information a skilled reader would gain from the application at its filing date. In the present case, from the above-cited passages of the original application and from the comments in the description regarding the disadvantages of the prior art (page 3, lines 10 to 25; "the measurement is not made with the same plug"), the reader gains the information that one of the main points of the invention (besides the spatial uniformity of the pad) is the maintenance of the properties of the pad during the measurement, which is achieved by inserting a pulse of pressure difference between the steps of forming and of flushing the pad, and by measuring the streaming potential during this pulse. The fact that in an apparatus for such measurements the necessary steps are automatically controlled by control means is understood by the reader to be the usual way of operating a measuring apparatus performing several steps and being applicable in an industrial plant, so that the reader understands the disclosed control means (140) to generally serve the purpose of controlling the necessary sequence of operations, independent of which steps might be required according to the one or the other embodiment.

For these reasons, the Board does not see a contravention of Article 123(2) EPC in the formulation of present Claim 1.

The additional feature of Claim 2 is disclosed on original page 10, lines 3/4 and in Figure 4. Claim 2 is therefore also allowable under Article 123(2) EPC.

The above-mentioned features of Claim 1 (as far as added after grant) do not extend, but rather restrict the scope of protection conferred. The requirements of Article 123(3) EPC are therefore also fulfilled.

4. *Novelty*

4.1 In correspondence with the subject-matter of Claim 1, D5 (see in particular page V43, right-hand column, paragraph 2 to page V44, right-hand column, paragraph 1 and Figures 2 and 3) describes a measuring apparatus for use in the measurement of an electrical characteristic, ie streaming potential, of a fibrous dispersion. The measuring cell of this known apparatus has a housing, first and second ports for fluid to be passed through the housing, a filter mesh between the ports and a respective electrode in each compartment on both sides of the filter mesh to measure the streaming potential. Naturally, first and second conduit arrangements for introducing particle-bearing stock and flushing water to the ports are provided. The first conduit arrangement includes connections for a source of particle bearing stock and drain. Moreover, it is implicitly disclosed that the known apparatus comprises control means for the valve means and for the measurement of streaming potential (see German "abstract", lines 4/5; page V43, right-hand column, lines 8/9 and 34 to 39; page V44, left-hand column, line 2; and page V45, left-hand column, lines 40/41), the control including the flushing of the pad subsequent to the measurement.

The apparatus according to Claim 1 is distinguished from this known apparatus by the fact that the cell is oriented to have the filter mesh essentially horizontally disposed with the first and second ports respectively below and above the filter mesh allowing a generally vertical flow direction and formation of the pad on the underside of the filter mesh, that valve means are provided in the first conduit arrangement, and that the control means are programmed so that subsequent to the formation of the pad a pulse of substantially constant pressure difference is applied across the pad, said pulse being shaped such that there is negligible accumulation of further particles to the pad, and a measurement of streaming potential is performed while said pressure pulse is applied.

4.2 D1 and D2 do not relate to the measurement of streaming potential, but to freeness testing. Consequently, there is not an electrode in each of the compartments before and after the filter mesh and no measurement of the potential between the compartments is made while the fluid is streaming through the pad.

D3 describes an apparatus for measuring the streaming potential in which the direction of fluid flow is vertical and the pad is horizontal.

However, the fluid is not a fibrous dispersion (but a solution of dye), the pad is not formed on a filter mesh during the flow of the fluid, but prefabricated and stuffed into the cell, and the pad is not flushed after the measurement. Since the fluid is not a fibrous dispersion, there is no necessary connection between the accumulation of particles on the pad and the pressure difference (ie velocity of flow). How the chosen pressure difference changes as a function of time during the measurement, is not mentioned.

D4 relates to the automatic measurement of streaming potential in a fibrous dispersion. A pad is built up on a filter mesh and flushed after the measurement. However, the arrangement is quite different from that according to the patent in suit since there are actually two filter meshes which are both not horizontal but vertical and between which the flow of the dispersion enters through a further port for forming the pad. The flows for building the pad and for making the measurement are not directed through the same ports of the measuring cell. Neither a separate pulse of pressure difference nor avoidance of further accumulation of particles during measurement are mentioned.

4.3 For these reasons, the subject-matter of Claim 1 is novel in the sense of Article 54 EPC.

5. *Inventive step*

5.1 It is undisputed that D5 represents the prior art closest to the subject-matter of the patent in suit since this document describes the principle of automatic measurement of streaming potential in a fibrous dispersion comprising the step of building the pad and measuring the streaming potential by using the same flow of dispersion through the filter mesh/pad (caused by a pressure difference across the pad).

As compared with this prior art, the subject-matter of Claim 1 aims at better reliability of the measurement (cf page 3, lines 22 to 25 of the original description) and, more specifically, at avoiding non-uniformity (cf page 3, lines 1 to 3) and temporal changes (cf page 3, lines 10 to 13, 16 and 17) of the pad while the measurement is made.

These goals are achieved on the one hand by choosing a horizontal orientation of the filter mesh, and on the other hand by employing a separate pulse of pressure difference (= fluid flow) across the pad shaped such that substantially no further accumulation of particles occurs (according to D5 the measurement is made while the pad is being built up).

5.2 It may be true that changing the filter orientation from vertical to horizontal (and consequently the direction of flow from horizontal to vertical) is a simple modification which a skilled person would always consider and the effects of which (reduction of the effects of sedimentation on the uniformity of the pad) could be seen beforehand.

However, the idea of temporally separating the build-up of the pad from the measurement of the streaming potential, while nevertheless using the same flow of dispersion for generating the streaming potential, and of ensuring the constancy of the precedingly formed pad during the measurement by shaping the separate pulse of pressure difference across the pad (ie the velocity and duration of flow of the dispersion generating the streaming potential) such that the amount of dispersion passing through the pad is not sufficient to provide substantial accumulation of further particles on the pad, is neither derivable from the teaching of D5 nor from the general experience of the skilled person.

5.3 Moreover, the idea of performing a measuring cycle of this kind could not be derived from any of the other cited documents.

In the apparatus for measuring streaming potential according to D4, the step of passing fluid through the pad is separated from the step of forming the pad.

However, the measuring fluid flow in this apparatus (comprising three ports and two filter meshes) is quite different from the pad forming flow, and the composition of the fluid used for generating the streaming potential is more or less undefined. No teaching is given regarding further accumulation of particles or a corresponding shape of a pressure pulse.

In the apparatus according to D3, the step of streaming potential measurement is also separated from the fabrication of the pad. However, the pad is not even fabricated in the measuring apparatus itself, and no teaching regarding the accumulation of further particles on the filter mesh could be derived since the fluid is not even a fibrous dispersion.

Finally, D1 and D2 do not relate to streaming potential measurement but to freeness testing, and consequently the measurement (of the amount of flow through the pad) is not separated from the formation of the pad.

5.4 Since for these reasons the above-mentioned idea is not obvious for a person skilled in the art, the subject-matter of Claim 1 involves an inventive step in the sense of Article 56 EPC. Claim 1 is therefore allowable under Article 52(1) EPC.

Claim 2 is allowable due to its dependence on Claim 1.

6. This decision relates to Claims 1 and 2 amended during the oral proceedings in the absence of the Respondent. Nevertheless, the Board does not consider this to be in conflict with Article 113(1) EPC and the decision of the Enlarged Board of Appeal G 04/92 (OJ EPO 1994, 149) since as compared with Claim 1 according to the former first auxiliary request known to the Respondent the present Claim 1 has in substance only been amended in

such a way as to clarify those points already mentioned, as lacking clarity, in a communication of the Board accompanying the summons to the oral proceedings and to supplement features already pointed out in the said communication as appearing to be essential for the invention. Thus, the Respondent had the opportunity to comment on these facts (cf. the similar findings in the unpublished decision T 202/92). Claim 2 essentially corresponds to Claim 1 according to the former third auxiliary request which is known to the Respondent.

7. Since the patent requires an adaptation of the description to the set of claims forming the basis for the maintenance of the patent, the Board remits the case to the Opposition Division in accordance with Article 111(1) EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the Opposition Division with the order to maintain the patent on the basis of: Claims 1 to 11 as submitted at the oral proceedings with the description to be adapted and the drawings as granted.

The Registrar: The Chairman:

P. Martorana E. Turrini