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Datasheet for the decision of 28 February 2018

Case Number: T 0264/14 - 3.3.05

Application Number: 09162618.4

Publication Number: 2133138

IPC: B01F5/06

Language of the proceedings: EN

Title of invention:
Static Mixer

Patent Proprietor:
NORDSON CORPORATION

Opponent:
Sulzer Mixpac AG

Headword:
Static mixer/NORDSON

Relevant legal provisions:
EPC Art. 83, 56

Keyword:
Sufficiency of disclosure - reproducibility (yes)
Inventive step - unexpected improvement shown

Decisions cited:
T 0409/91, T 0435/91, T 1743/06

Catchword:

Europäisches Patentamt
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Beschwerdekammern

Boards of Appeal

Chambres de recours

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Case Number: T 0264/14 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 28 February 2018

Appellant: (Opponent)	Sulzer Mixpac AG Rütistrasse 7 9469 Haag (CH)
Representative:	Manitz Finsterwald Patentanwälte PartmbB Postfach 31 02 20 80102 München (DE)
Respondent: (Patent Proprietor)	NORDSON CORPORATION 28601 Clemens Road Westlake, OH 44145 (US)
Representative:	Eisenführ Speiser Patentanwälte Rechtsanwälte PartGmbB Postfach 10 60 78 28060 Bremen (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 21 November 2013 rejecting the opposition filed against European patent No. 2133138 pursuant to Article 101(2) EPC**

Composition of the Board:

Chairman	E. Bendl
Members:	J.-M. Schwaller
	R. Winkelhofer

Summary of Facts and Submissions

I. The present appeal lies from the decision of the opposition division to reject the opposition against European patent No. 2 133 138, independent claims 1 and 10 of which read as follows:

"*1. A mixer (10) for mixing at least first and second fluids, comprising:*
a conduit (12, 18) configured to receive a stream of the first and second fluids; and
a first series of mixing elements (28) disposed within the conduit and configured to divide the stream in a first direction; and
a second series of mixing elements (34) disposed within the conduit and configured to divide the stream in a second direction different from the first direction;
wherein the mixing elements of the first series each comprises a first planar member (56, 66) oriented in the first direction and defining a leading, stream dividing edge, a second planar member (78, 74) oriented in the second direction and defining a trailing, stream recombining edge, a first deflecting surface (84) extending outwardly from a first side of the first planar member and configured to direct fluid flow to a space adjacent a first side of the second planar member, and a second deflecting surface (86) extending outwardly from a second side of the first planar member and configured to direct fluid flow to a space adjacent a second side of the second planar member."

"*10. A mixer (10) for mixing at least first and second fluids, comprising:*
a conduit (12) configured to receive a stream of the first and second fluids; and

a mixing component (14) positioned within the conduit, the mixing component including:
a first series of mixing elements (28) each configured to divide the stream in a first direction and recombine the stream in a second direction;
a second series of mixing elements (34) each configured to divide the stream in a third direction different from the first direction and recombine the stream in a fourth direction different from the second direction; and
an auxiliary baffle (32) positioned between two respective mixing elements of the first and second series, the auxiliary baffle configured to direct portions of the stream from a center of the conduit to a periphery of the conduit and portions of the stream from the periphery of the conduit to the center of the conduit."

II. With the grounds of appeal, the appellant (opponent) contested the above decision and filed new documents, among them an Annex I, including three slides and simulation results, and document E12 (US 4 220 416 A).

It objected to the invention as being insufficiently disclosed, arguing in particular that Annex I, slide 2, showed that not all the embodiments falling under the claimed subject-matter provided for improved mixing, and so the skilled person did not know how to put the invention into practice over the entire scope claimed.

It further objected under Article 56 EPC to claims 1 and 10 as granted and argued that their subject-matter lacked inventive step over the disclosure of document D1 (WO 2004/004875 A2) taken in combination with the teaching of any of documents E2 (US 4 408 893 A), E3 (US 5 484 203 A), E5 (US 4 466 741 A),

E8 (EP 1 426 099 B1) and E12.

III. With its response to the grounds of appeal, the respondent (patent proprietor) requested that the late-filed documents, among them Annex I and E12, not be admitted. Further, it maintained the claims as granted as its main request and filed inter alia auxiliary request 1.

IV. After receiving the board's preliminary opinion, the respondent filed a second, third and fourth auxiliary request.

V. Further observations were received from the appellant, which requested in particular that the latter requests not be admitted into the proceedings.

VI. At the oral proceedings, the discussion focused in particular on the compliance of the claims as granted with the requirements of Articles 83 and 56 EPC.

VII. At the closure of the debate, the parties' requests were as follows:

The appellant requested that the decision under appeal be set aside and that the patent be revoked.

The respondent requested that the appeal be dismissed and that the patent be maintained as granted or, alternatively, in amended form on the basis of one of the sets of claims according to auxiliary requests 1 (filed on 15 August 2014) or 2 to 4 (all filed on 26 January 2018).

Reasons for the Decision

1. Admissibility of the late-filed documents

Even assuming, in the appellant's favour, that Annex I and E12 were admitted into the proceedings, the appeal would still not succeed (see the reasoning below). Therefore, there is no need to further discuss their admissibility.

Main request (claims as granted)

2. Sufficiency of disclosure of the invention

It is established case law that the requirements under Article 83 EPC for sufficiency of disclosure are met if the claimed invention could have been performed at the filing date of the application by a person skilled in the art in the whole area claimed without undue burden, using common general knowledge and having regard to further information given in the patent in suit (see e.g. T 409/91, OJ 1994, 653, Reasons 3.5; T 435/91, OJ 1995, 188, Reasons 2.2.1; T 1743/06, Reasons 1.1).

In the case at issue the claimed invention is a physical entity, namely the static mixer as currently defined in independent claims 1 and 10 as granted. Such static mixers are in particular illustrated in Figures 1 to 4 of the patent, which show specific constructional possibilities of said physical entity. Further specific details of the claimed invention, in particular regarding the geometry of the individual mixing elements or baffles contained in the claimed mixers, are described in paragraphs [0011] to [0026] of the patent specification.

As to whether a person skilled in the art was able to reproduce the claimed static mixers without undue burden, there is no particular reason to believe that the manufacturing, and so the reproduction, of such devices would give rise to any particular difficulty, since they can be produced e.g. by injection moulding, in the same way as the mixing devices of the closest prior-art document D1 (see page 3, lines 4 and 5), which discloses mixing devices having a very similar structure.

The appellant's argument - that the alleged increased mixing effect would not be achieved with certain types of mixers falling within the terms of the claimed invention or with fluids having high viscosity - does not concern the issue of sufficiency of disclosure of the invention, since the invention relates to a physical device which is not defined either by its mixing efficiency or by its ability to mix viscous fluids. The disclosure of Annex I, which is supposed to show that certain kinds of fluids would not be efficiently mixed by the claimed mixer, would therefore be no proof of lack of sufficiency of disclosure, but, on the contrary, would show that the skilled person knows how to select the parameters needed for reproducing the claimed invention comprising the first and second single mixing elements.

It follows that the claimed invention can be easily manufactured, and so reproduced by a person skilled in the art. The board has therefore no reason to believe, as asserted by the appellant, that the requirements of Article 83 EPC would not be met.

3. Inventive step

3.1 First of all, the meaning of the claimed subject-matter has to be construed, since the appellant was of the opinion that the term "series" could be interpreted as including an arrangement in which the elements of the first series and the elements of the second series were provided individually in an alternating manner. It also argued on the basis of Annex I that such an arrangement was not inventive.

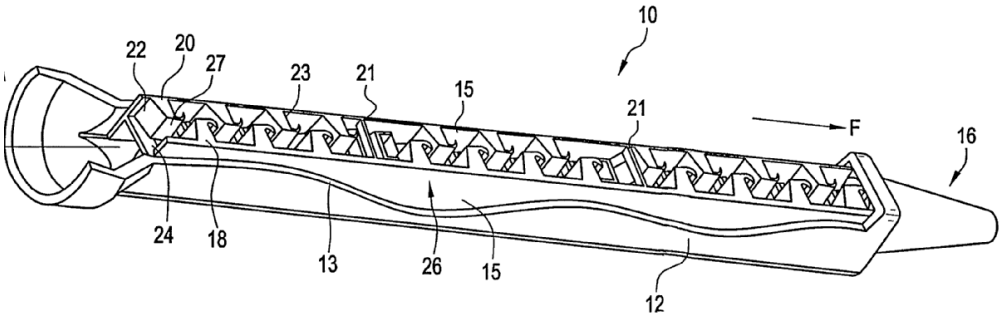
The board is not convinced by this interpretation of the term "series", in particular in view of the embodiments illustrated in the patent, which do not show any such alternation. Moreover, given that a "series" conventionally characterises a number of objects of a similar or related kind which are directly aligned with each other, there is no reason to depart from this conventional definition, thus excluding the alternating arrangement envisaged by the appellant.

3.2 The above interpretation thus renders irrelevant the disclosure of Annex I, slide 2, as representing an embodiment of the present invention, since slide 2 concerns an embodiment in which the mixing elements are connected in an alternating manner.

3.3 In keeping with the problem-solution approach, the subject-matter of the claims as granted involves an inventive step for the following reasons:

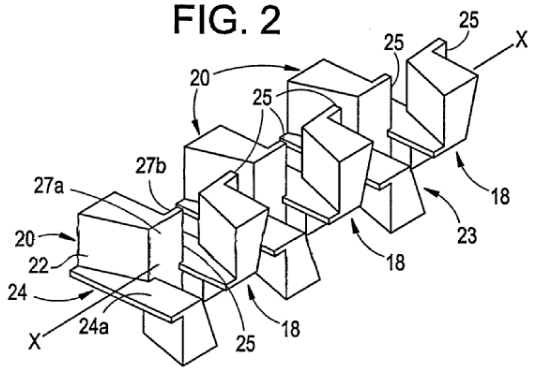
3.3.1 Document D1, which both parties acknowledge as representing the closest prior art, discloses (see figure 1 below) a static mixer (10) including a series of alternating left- and right-handed baffles (18, 20) and flow inversion baffles (21) (D1, paragraph [0028]).

FIG. 1



As can be seen from Figure 2 below, the unit

FIG. 2



consisting of one left-handed baffle (18) and the next right-handed baffle (20) corresponds to one of the "mixing elements" of "the first series" as currently defined in claim 1 or 10 of the contested patent, and the baffle (21, see Fig.1) corresponds to the "auxiliary baffle" as currently defined in claim 10 of the contested patent.

D1 does not disclose a second series of mixing elements disposed within the conduit and configured to further divide the stream in a direction different from the one imparted by the mixing elements of the first series. This has also been acknowledged by the appellant (see its grounds of appeal, page 12, last paragraph, and page 16, last full paragraph).

3.3.2 The problem underlying the claimed invention is defined (see paragraph [0006] of the patent) as providing a mixer that reduces streaking and/or does not require an orientation step during assembly. Paragraph [0024]

further discloses that by dividing the fluid stream in different directions, overall mixing quality is improved.

3.3.3 As a solution to this problem, the contested patent proposes the mixer according to independent claim 1 or 10, which are both characterised in that a second series of mixing elements is disposed within the conduit to further divide the stream in a direction different from the one imparted by the mixing elements of the first series.

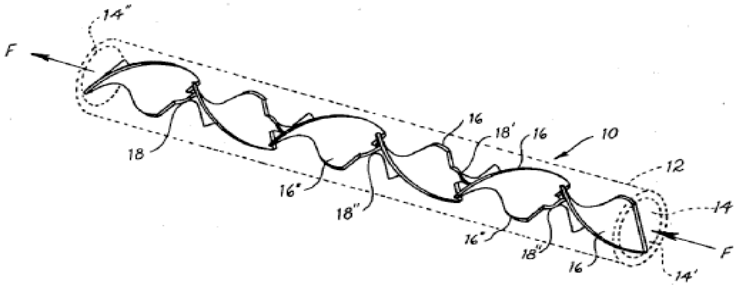
3.3.4 D1 (see page 2, lines 5 to 8) aims at reducing streaking too, so this particular problem is not the objective one to be solved over D1. The same remark applies to the second problem defined above, since the mixers defined in claim 1 or 10 as granted are not symmetrical and so do indeed require an orientation step during assembly.

However, it is credible that at least the overall mixing quality can be improved by further dividing the fluid stream in a different direction, and so the problem identified in point 3.3.2 above is to be reformulated and thus restricted to the provision of a mixer having improved mixing quality.

3.3.5 As regards the obviousness of the claimed subject-matter over the closest prior art D1, it has to be determined whether the proposed solution was obvious in the light of the prior art, in particular documents E2, E3, E5, E8 or E12 which the appellant held to be particularly relevant in this context.

For the board, the proposed solution is not obvious in the following respects.

3.3.6 E2 (see in particular Figure 1 reproduced below) discloses mixing elements arranged in an alternating



manner, and so for this reason alone the skilled person considering this document could not arrive at the wording of claim 1 at issue.

3.3.7 The same conclusion arises for the content of document E3, which fails to disclose a first series of mixing elements and a second series of mixing elements.

The invention underlying E3 does indeed disclose mixing elements which, as can be seen from figure 4, divide the stream in different directions; however, as shown

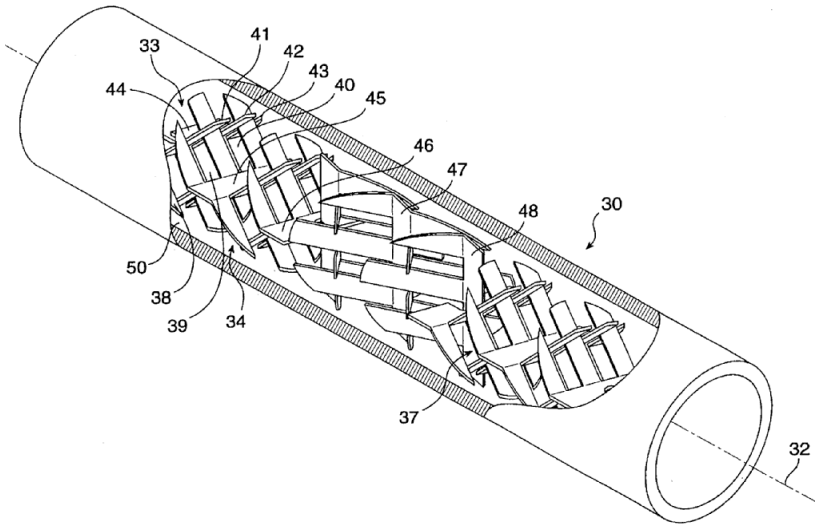


FIG. 4

by figure 5 below - which is an exploded view of the mixing apparatus of figure 4 - the mixer of E3 includes

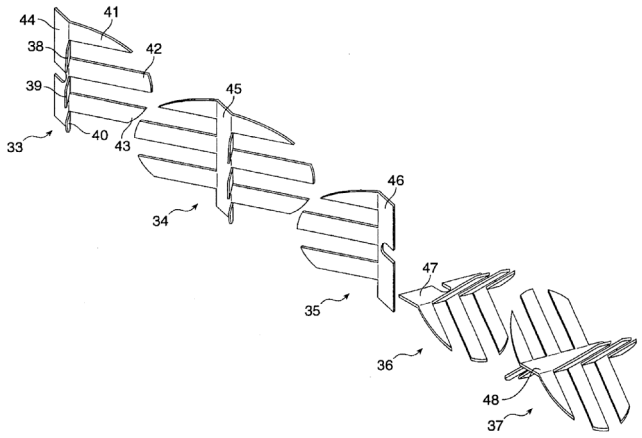
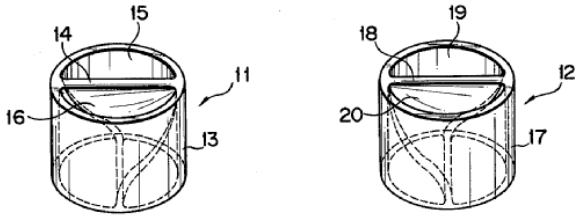


FIG. 5

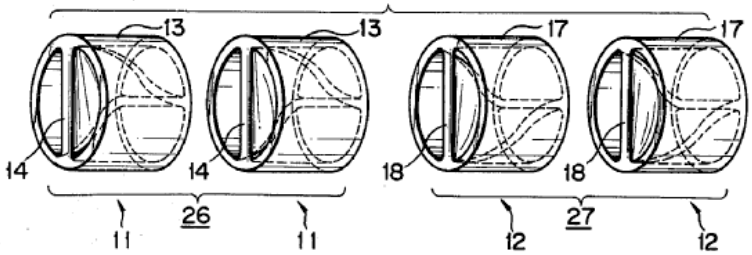
five different mixing elements which structurally differ from each other, and so it does not include a first series and a second series of mixing elements.

3.3.8 E5 discloses mixing devices comprising a cylindrical conduit including a sequence of longitudinally coupled elements comprising helical blades, such as the right- and left-handed 90-degree-rotation elements (11) and (12) illustrated below (see Figures 7 and 8).



In the particular embodiment illustrated in Figure 15,

FIG. 15



a first series of mixing elements (11), in which the fluid is rotated clockwise, is coupled with a second series of mixing elements (12), in which the fluid is

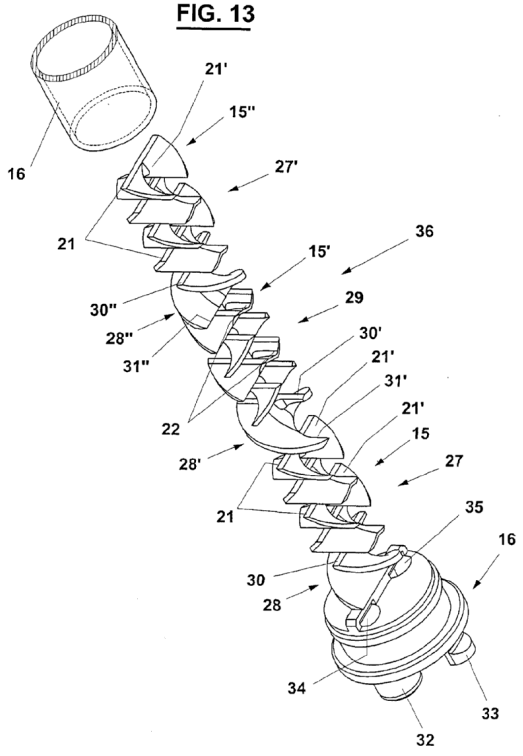
rotated counter-clockwise. The fluid is thus rotated differently in the second series of mixing elements but **not divided** in a second direction different from the first direction since, as can be seen from figure 15, the dividing edge in all facing ends of the four elements (11) and (12) is oriented in the **same** direction, namely vertically.

In all other specific embodiments of E5, the mixing elements (11) and (12) are coupled in an alternating manner, which is outside the scope of protection of the claims at issue.

If follows that E5 does not suggest the solution proposed in claim 1 or claim 10 at issue either.

3.3.9 E8 teaches the use of two groups of mixing elements (see figure 13 and corresponding paragraphs [0036] to [0039]).

FIG. 13



The form of the mixing elements is different from that claimed (e.g. with regard to the planar members), and an auxiliary baffle as defined in the present case is also not mentioned. Although three series of mixing elements (15, 15', 15'') are used, the skilled person does not gain any incentive to modify the form of these mixing elements or to use an auxiliary baffle, i.e. to apply the teaching of E8 to the closest prior art D1, in order to arrive at the present invention.

3.3.10 E12 in figures 10 and 11 discloses a static mixing device consisting of a first series (or set 18) of mixing inserts 12 oriented in a first direction and

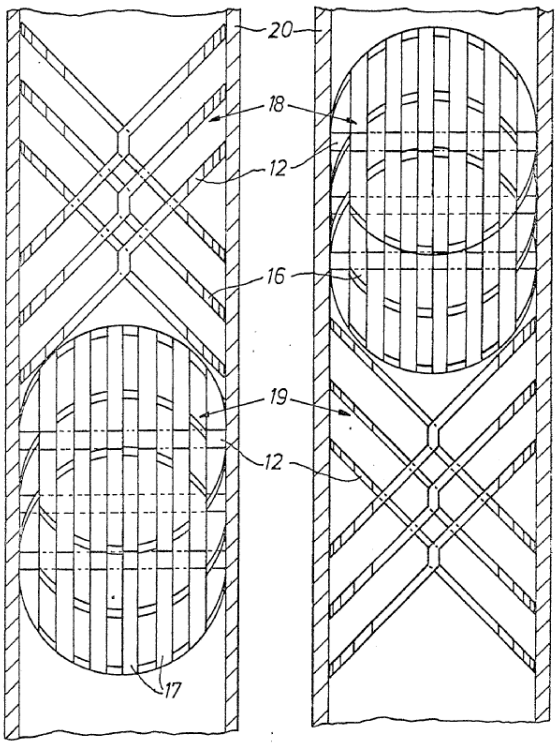


FIG. 10 FIG. 11

a second series (or set 19) of mixing inserts 12 axially oriented in a second direction different from the first direction.

The planar members of the individual mixing inserts are, on the one hand, provided with throughflow slots

17 and webs 16 and, on the other hand, oblique to the fluid flow, so that they define neither "a leading, stream dividing edge" nor "a trailing, stream recombining edge" in the sense of claim 1 or 10 at issue.

The above first and second directions thus do not correspond to the "first direction" and "second direction" as defined in present claims 1 and 10, namely in that the "first direction" is the one defined by a first planar member "defining a leading, stream dividing edge", while the "second direction" is the one defined by a second planar member "defining a trailing, stream recombining edge".

Lastly, E12 does not teach that arranging a first series of mixing elements along with a second series of mixing elements would improve the mixing performance. Instead, it aims at providing an apparatus for continuous static mixing having a short length and low pressure loss, which also has a good homogenisation effect in the peripheral zones, i.e. at the tube wall (E12, column 1, lines 51 to 55).

It follows that the skilled person knowing the content of document E12 and faced with the problem underlying the invention, i.e. providing a static mixer having improved mixing quality, would not arrive at the wording of claim 1 or 10 at issue.

3.3.11 The remaining documents cited in the opposition proceedings were no longer relied upon by the appellant at the appeal stage. None of these documents contains further information which would point towards the claimed solution of the problem stated above.

3.4 It follows from the above considerations that, having regard to the state of the art, the subject-matter of independent claims 1 and 10 as granted, and by the same token that of claims 2 to 9 and 11 to 22 which depend thereon, is not obvious to a person skilled in the art and so involves an inventive step within the meaning of Article 56 EPC.

4. Since the claims as granted meet the requirements of the EPC, there is no need to consider the lower-ranking requests.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

C. Vodz E. Bendl

Decision electronically authenticated