

The opinion in support of the decision being entered today was *not* written
for publication and is *not* binding precedent of the Board

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MAILVAGANAM MAHENDRAN,
KENNETH PAUL GOODBOY and LUIGI FABBRICINO

Appeal 2007-0365
Application 10/941,351¹
Technology Center 1700

Oral Argument: None
Decided: 8 May 2007

Before: FRED E. McKELVEY, *Senior Administrative Patent Judge*, and
CAROL A. SPIEGEL and MARK NAGUMO, *Administrative Patent
Judges*.

McKELVEY, *Senior Administrative Patent Judge*.

DECISION ON APPEAL

¹ Application for patent filed 14 September 2004. The application
on appeal (1) is said to be a continuation of application 10/037,432, filed
04 January 2002 (now abandoned), which is turn (2a) is said to be a
continuation-in-part of application 09/335,073, filed 17 June 1999 (now U.S.
Patent 6,354,444) and (2b) a continuation-in-part of application 08/886,652,
filed 01 July 1997 (now U.S. Patent 5,914,039). *See* Specification, page 1,
¶ 0001.

1 **A. Statement of the case**

2 The appeal under 35 U.S.C. § 134(a) is from a final rejection of
3 claims 1-37.

4 Claims 2-7, 10-16, 18-21 and 23-37 were cancelled in an amendment
5 filed with the Appeal Brief.

6 The claims remaining are claims 1, 8-9, 17 and 22.

7 We have jurisdiction under 35 U.S.C. § 6(b).

8 The real party in interest is Zenon Technology Partnership. Other
9 entities having some interest in the application are said to include (1) GE
10 Zenon ULC, (2) 1244734 Alberta ULC, (3) GE Betz Canada Company,
11 (4) GE Betz Dearborn Canada Company, (5) GE Betz, Inc., (6) MRA
12 Investments Inc., (7) MRA System, Inc., (8) GE Investments, Inc., and
13 (9) the General Electric Company. Appeal Brief, page 1.

14 The Examiner relies on the following prior art

15 Mahendran U.S. Patent 5,472,607 05 December 1995

16 Brun U.S. Patent 3,948,781 06 April 1976

17 Both Mahendran and Brun are prior art vis-à-vis Appellants' claimed
18 subject matter under 35 U.S.C. § 102(b).

19 The Examiner rejected claims 1, 8-9, 17 and 22 as being anticipated
20 under 35 U.S.C. § 102(b) by Mahendran.

21 The Examiner also rejected claims 1, 8-9, 17 and 22 as being
22 unpatentable under 35 U.S.C. § 103(a) over the combination of Mahendran
23 and Brun.

1 **B. Issues**

2 There are two principal issues.

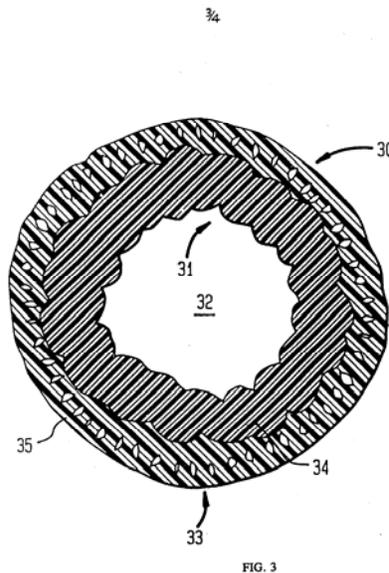
3 The first issue is whether appellants have established that the
4 Examiner erred in rejecting claims 1, 8-9, 17 and 22 as being anticipated
5 under 35 U.S.C. § 102(b) by Mahendran.

6 The second issue is whether Appellants have established that the
7 Examiner erred in rejecting claims 1, 8-9, 17 and 22 as being unpatentable
8 under 35 U.S.C. § 103(a) over the combination of Mahendran and Brun.

9 **C. Findings of fact**

10 The following findings of fact are believed to be supported by at least
11 a preponderance of the evidence. To the extent a finding is a conclusion of
12 law, it may be treated as such.

13 The invention on appeal relates to a separation membrane.
14 Specification, page 1, ¶ 0002; Fig. 3.



15
16 With reference to Fig. 3, the separation membrane **30** is composed of
17 a tubular braid support **31** made of woven yarn having a “lumen” (inner

1 bore) **32** surrounded by a thin porous substance **33**. *See also* Specification,
2 page 15, ¶ 0035.

3 The claims read as follows [bracketed text and bold drawing element
4 numbers added].

5 **Claim 1.** A separation membrane **30** comprising,

6 (a) a tubular braid support **31** for a hollow **32** fiber separation
7 membrane **30** made from 16 to 60 separate yarns, each yarn being
8 between 150 and 400 denier, the tubular braid support having an
9 outside diameter between 1.5 and 2.5 mm and a wall thickness greater
10 than 0.2 mm and less than 1.0 mm, the tubular braid support **31** having
11 at least 30 picks per inch; and,

12 (b) a porous substance **33** attached to the [tubular braid]
13 support **31**, the porous substance **33** covering the outer circumferential
14 surface **34** of the [tubular braid] support **31**, the porous substance **33**
15 being between 0.05 and 0.3 mm thick beyond the outer surface of the
16 [tubular braid] support **31** and having pores suitable for use as a
17 separation membrane.

18 **Claim 8.** The membrane of **claim 1** wherein the air
19 permeability of the [tubular braid] support without the porous
20 substance attached is at least 1 cc/sec/cm² at 1.378 kPa.

21 **Claim 9.** The membrane of **claim 8** wherein the air
22 permeability of the [tubular braid] support without the porous
23 substance attached is less than about 10 cc/sec/cm² at 1.378 kPa.

24 **Claim 17.** A separation membrane **30** comprising,

25 (a) a support **31** for a hollow **32** fiber separation membrane
26 made from yarns braided into a tube, each yarn being between 200
27 and 400 denier, with from 16 to 60 carriers; and,

1 (b) a porous substance **33** attached to and covering the outer
2 circumferential surface **34** of the support and having pores suitable for
3 use as a separation membrane, wherein, the support has at least 36
4 crosses per inch, an outside diameter of between 1.5 mm and 2.5 mm
5 and a wall thickness of more than 0.15 mm and less than 0.5 mm.

6 **Claim 22.** The membrane of **claim 17** wherein the air
7 permeability of the support without the porous substance attached is
8 less than about 10 cc/sec/cm² at 1.378 kPa.

9 Mahendran describes a hollow separation membrane made from
10 a support with an outer covering which is a porous substance. Col. 1:6-23;
11 col. 4:65 through col. 5:5.

12 According to Mahendran, a Caro patent describes the use in the art of
13 hollow separation membranes made with multiple carriers, preferably 24, to
14 braid a tubular braid. Col. 3:31-32. The prior art use of 24 carriers falls
15 within the scope of appellants' 16 to 60 separate yarns. Based on the prior
16 art described in Mahendran, a person skilled in the art would know that the
17 use of multiple carriers, including those with 24 carriers, would be useful in
18 accomplishing the objective sought by Mahendran.

19 The yarns described by Mahendran are 210 denier (1 denier = 9000
20 yards of yarn weighing 1 gram). Col. 7:44-52. A 210 denier yarn falls
21 within scope of Appellants' 150 to 400 (claim 1) or 200 to 400 (claim 17)
22 denier yarns.

23 The outside diameter of the Mahendran braided support ranges from
24 about 0.6 mm to 2.5 mm. Col. 8:26-27. The range described by Mahendran
25 encompasses Appellants' outside diameter range of 1.5 mm to 2.5 mm
26 (claims 1 and 17).

1 The support wall thickness described by Mahendran is 0.1 mm to 0.7
2 mm, preferably 0.3 mm to 0.5 mm. Col. 8:19-21. The preferred Mahendran
3 wall thickness falls within the scope of Appellants' thickness of greater than
4 0.2 mm to less than 1.0 mm (claim 1). The preferred Mahendran range
5 overlaps appellants' thickness of more than 0.15 mm and less than 0.5 mm
6 (claim 17). "[L]ess than 0.5 mm" does not include 0.5 mm.

7 The support wall braid of Mahendran is made up of 20 to 100
8 picks per 25.4 mm (*i.e.*, essentially 1 inch), preferably 5-50 picks.
9 Col. 8:23-26. Appellants' support has at least 30 picks (*i.e.*, crosses per
10 inch). See also Specification, page 7 ¶ 0016 ("[t]he braid is preferably
11 woven with from 16 to 28 carriers with from about 36 to 44 picks
12 (crosses/inch) ...")

13 The porous substance of Mahendran is described as having a wall
14 thickness 0.01 mm to 0.1 mm (col. 15:36—in Mahendran claim 1), including
15 a specific wall thickness of 0.05 mm (col. 12:63). The range of 0.01 mm to
16 0.1 mm overlaps that of Appellants' claimed range of between 0.05 mm and
17 0.3 mm.

18 Appellants' separation membrane is used for the same general
19 purpose as the separation membrane described by Mahendran.

20 We assume that Appellants believe that the claimed separation
21 membranes are an improvement over the separation membranes described
22 by Mahendran.² Specification, pages 1-2, ¶ 0003.

23 Insofar as we can tell, on this record Appellants have not called our
24 attention to any credible experimental scientific evidence which would

² In deciding the appeal, we have assumed that the Mailvaganam Mahendran of the prior art reference is the same individual as Mahendran Mailvaganam named in the application on appeal.

1 establish that the claimed separation membranes achieve a result not
2 achieved by those described by Mahendran.

3 We find it unnecessary to describe Brun.

4 Other findings as necessary appear in the “Discussion” section of this
5 opinion.

6 **D. Principles of law**

7 An anticipation requires a prior art reference to describe every
8 limitation in a claim—either explicitly or inherently. *See, e.g., In re*
9 *Schreiber*, 128 F.3d 1473, 1477, 44 USPQ2d 1429, 1431 (Fed. Cir. 1997).

10 A prior art range which overlaps, but is not wholly included within, a
11 claimed range generally does not anticipate the claimed range. *See, e.g.,*
12 *Atofina v. Great Lakes Chemical Corp.*, 441 F.3d 991, 78 USPQ2d 1417
13 (Fed. Cir. 2006) ((1) prior art temperature range of 100°C to 500°C does not
14 anticipate claimed range of 330°C to 450°C (441 F.3d at 999, 78 USPQ2d at
15 1423) and (2) prior art range of 0.001 to 1% oxygen to methylene chloride
16 molar ratio does not anticipate range of 0.1% to 5.0% oxygen to methylene
17 chloride molar ratio (441 F.3d at 1000, 78 USPQ2d at 1424)).

18 A *prima facie* case of obviousness generally arises where the ranges
19 described in the prior art overlap claimed ranges. *See, e.g., In re Harris*, 409
20 F.3d 1339, 1341, 74 USPQ2d 1951, 1953 (Fed. Cir. 2005).

21 Where the difference between the claimed invention and the prior art
22 is some range or other variable within the claims, generally the applicant
23 must show that particular claimed range is critical (i.e., patentably distinct),
24 by showing that the claimed range achieves an unexpected result relative to
25 the prior art range. *See, e.g., In re Woodruff*, 919 F.2d 1575, 1578, 16
26 USPQ2d 1934, 1936-37 (Fed. Cir. 1990).

1 Whether a claimed invention produces an unexpected result is a
2 question of fact. *See, e.g., In re Harris*, 409 F.3d at 1341, 74 USPQ2d at
3 1953.

4 When showing unexpected results, an applicant for patent has the
5 burden of establishing that the claimed invention actually produces the
6 results said to be achieved with the invention. It is not enough to show
7 results are obtained which differ from those obtained in the prior art. Any
8 difference must be shown to be an unexpected difference. *See, e.g., In re*
9 *Klosak*, 455 F.2d 1077, 1080, 173 USPQ 14, 16 (CCPA 1972). *See also In*
10 *re DeBlauwe*, 736 F.2d 699, 705, 222 USPQ 191, 196 (Fed. Cir. 1984)
11 (evidence of non-obviousness must be objective factual evidence, and not
12 merely argument or conclusory statements of the applicant; DeBlauwe did
13 not present any experimental data showing that prior heat shrinkable articles
14 split; due to the absence of tests comparing appellants' heat shrinkable
15 articles with those of the closest prior art, the DeBlauwe court concluded
16 that appellants' assertions of unexpected results constitute mere argument)
17 and *In re Geisler*, 116 F.3d 1465, 1470, 43 USPQ2d 1362, 1364 (Fed. Cir.
18 1997) (Geisler did not offer evidence of unexpected results).

19 Where, as here, the claimed and prior art products reasonably appear
20 to be identical or substantially identical, or are produced by identical or
21 substantially identical processes, an applicant can be placed under a burden
22 to prove that the prior art products do not necessarily or inherently possess
23 the characteristics of applicant's claimed product. *See, e.g., In re Best*, 562
24 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977) and *In re Spada*, 911
25 F.2d 705, 708-9, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

26 Optimization of a prior art range flows from the normal desire of
27 scientists or artisans to improve upon what is already generally known.

1 *Pfizer, Inc. v. Apotex, Inc.*, 380 F.3d 1348, 82 USPQ2d 1321 (Fed. Cir.
2 2007).

3 **E. Discussion**

4 Anticipation

5 The Examiner's rejection of the claims for anticipation under 35
6 U.S.C. § 102(b) is foreclosed by the Federal Circuit's decision in *Atofina v.*
7 *Great Lakes Chemical Corp.*, 441 F.3d 991, 78 USPQ2d 1417 (Fed. Cir.
8 2006).

9 Just as the ranges in *Atofina* were not anticipated by the prior art, so it
10 is here.

11 Appellants' collective ranges of (1) braided support outside diameter
12 of 1.5 mm to 2.5 mm and (2) porous substance wall thickness of between
13 0.05 mm and 0.3 mm are not anticipated by Mahendran's collective ranges
14 of (A) braided support outside diameter of about 0.6 mm to 2.5 mm and
15 (B) porous substance wall thickness of between 0.01 mm to 0.1 mm even
16 though both of appellants' ranges overlap those described by Mahendran.

17 No embodiment described by Mahendran has been shown to include
18 all of the limitation of the claims on appeal.

19 At the time the Examiner entered the Examiner's Answer in July of
20 2006, the Examiner may not have known of *Atofina* which was decided in
21 March of 2006, with a petition for rehearing *en banc* being denied in May of
22 2006. We would be surprised that if the Examiner had known of *Atofina*,
23 the anticipation rejection would have been maintained on appeal.

24 Because the anticipation rejection is essentially controlled by the
25 rationale of *Atofina*, we now reverse that rejection.

1 Obviousness

2 The Examiner rejected the claims as unpatentable under 35 U.S.C.
3 § 103(a) because in the Examiner's view the subject matter claimed would
4 have been obvious.

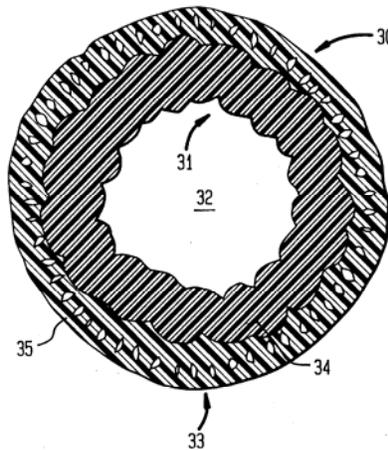
5 In making the obviousness rejection, the Examiner relied on a
6 combination of Mahendran and Brun.

7 In light of the binding precedent cited above, we are of the opinion
8 that the claimed subject would have been *prima facie* obvious over
9 Mahendran alone and therefore affirm.

10 What is factually manifest in this case is at least the following.

11 (1) The separation membranes of both Appellants and
12 Mahendran appear to have a similar appearance. Compare (1) Appellants'
13 Fig. 3 [reproduced above] with (2) Fig. 2 of Mahendran:

FIG. 2

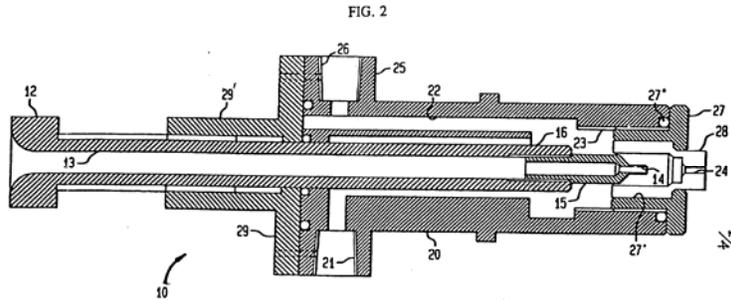


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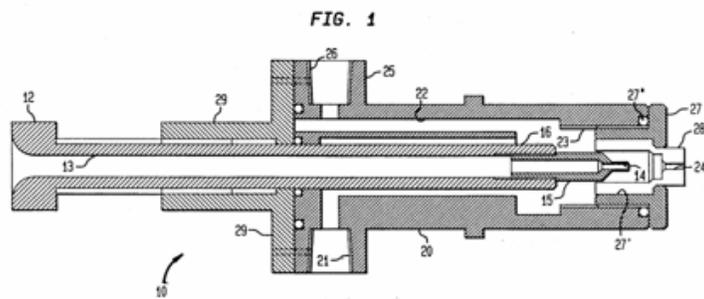
15

Mahendran Fig. 2

1 (2) The separation membranes appear to be made using similar
2 apparatus. Compare (1) Appellants' Fig. 2 and Specification, page 5, ¶ 0012
3 and page 12, ¶ 0030 through page 15, ¶ 0034 with (2) Fig. 1 and col. 7,
4 lines 3-5 and col. 9, line 10 through col. 10, line 26 of Mahendran:



5
6 Appellants' Fig. 2



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8
9 Mahendran Fig. 1

10 (3) The separation membranes of both Appellants and
11 Mahendran are described as being useful for generally the same purpose.

1 (4) Each of Appellants’ claimed physical structural elements is
2 found in Mahendran.

3 (5) While some those physical structural elements, such as the
4 outside diameter of the braided support and the porous substance wall
5 thickness, do not have the same precise dimensions, the dimensions overlap.

6 (6) No credible evidence has been relied on in an attempt to
7 show that the use of Appellants’ separation membrane achieves a result not
8 obtained with the use of the separation membrane of Mahendran.

9 Appellants argue that Mahendran “says nothing about the air
10 permeability of any support.” Reply Brief, page 2.

11 However, Appellants have not called our attention to any credible
12 evidence that the air permeability of Mahendran is in any way unexpectedly
13 different from that of the claimed separation membranes. On this record, for
14 all we know, Appellants have found the optimal embodiment within the
15 ranges described by Mahendran—ranges which Mahendran tells one skilled
16 in the art are appropriate. *See Pfizer, supra.*

17 In light of binding Federal Circuit and CCPA precedent mentioned
18 above, we believe the Examiner had a reasonable basis for asking Appellants
19 to show that the claimed separation membranes do not possess the
20 characteristics of the separation membranes described by the Mahendran
21 prior art reference, especially the characteristics set out in claims 8-9 and 22.
22 *See, e.g., Examiner’s Answer, page 7.*

1 cc (via First Class mail)

2

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