

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

Paper No. 21

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* MATTHEW P. MITCHELL

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Appeal No. 2002-0064  
Application No. 09/084,042

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ON BRIEF

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Before FRANKFORT, STAAB, and BAHR, *Administrative Patent Judges*.  
STAAB, *Administrative Patent Judge*.

*DECISION ON APPEAL*

Matthew P. Mitchell appeals from the examiner's final rejection of claims 1-12. Claims 13-20, the only other claims currently pending in the application, have been withdrawn from further consideration pursuant to 37 CFR § 1.142(b) as not being readable on the elected invention.

Appellant's invention pertains to an improved regenerator comprising a plurality of separate concentric foil layers. A copy of the appealed claims appears in the appendix to appellant's main brief.

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The references cited the examiner in the final rejection against the claims are:

Pauletta	3,468,634	Sep. 23, 1969
Yaron et al. (Yaron)	5,429,177	Jul. 4, 1995

Claim 1 stands rejected under 35 U.S.C. § 102(b) as being anticipated by Pauletta.

Claims 2-5 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Pauletta.

Claims 6-12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Pauletta in view of Yaron.

Reference is made to appellant's main and reply briefs (Paper Nos. 17 and 19) and to the examiner's answer (Paper No. 18) for the respective positions of appellant and the examiner regarding the merits of these rejections.

*I. The anticipation rejection of claim 1*

Independent claim 1 reads as follows:

1. An improved regenerator comprising a plurality of separate concentric layers of regenerator foil installed in a generally cylindrical space.

Pauletta, discussed in more detail below, pertains to a concentric tube odor eliminator. Pauletta's device includes a

heat exchanger in the form of a plurality of concentric tubular members 16. The walls of the concentric tubular members may be undulating (column 2, lines 51-58).

In rejecting claim 1 as being anticipated by Pauletta, the examiner states (answer, page 5) that

there is no claimed structural difference between the claimed invention and Pauletta . . . . Since the device of Pauletta meets appellant's structurally claimed device, then the device of Pauletta anticipates the claimed device an [sic, and] can be used in all [the same] environments and systems as [the] claimed device and operate in the same fashion as appellant's claimed device. . . . [A]ppellant does not claim any valving or fluid system or the details of any system into which the claimed device is to [be] employed.

We consider the examiner's determination that the concentric tubing members 16 of Pauletta's heat exchanger correspond to the elements of claim 1 set forth in the body of the claim to be well founded.<sup>1</sup> However, we do not consider this determination to be dispositive of the anticipation issue raised in this appeal in that it does not take into account the effect the preamble recitation "regenerator" should be given in determining what subject matter claim 1 encompasses.

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<sup>1</sup>The claim terms "regenerator foil" and "generally cylindrical space" are defined on page 9 of appellant's specification; however, these terms, as so defined, do not appear to distinguish over the concentric tubing members 16 of Pauletta's heat exchanger.

Whether a preamble or introductory clause constitutes a limitation on a claim is a matter to be determined by the facts of each case in view of the claimed invention as a whole. *Corning Glass Works v. Sumitomo Elect. U.S.A., Inc.*, 868 F.2d 1251, 1257, 9 USPQ2d 1962, 1966 (Fed. Cir. 1989); *In re Stencel*, 828 F.2d 751, 754, 4 USPQ2d 1071, 1073 (Fed. Cir. 1987); *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 480-81 (CCPA 1951). In the present case, we agree with appellant's argument (reply brief, page 2) to the effect that the preamble recitation "regenerator" is a limitation on claim 1 that implies a particular kind of heat exchange device. Here, the specification makes clear that appellant's inventive energies are directed to correcting a perceived problem in the particular field of foil regenerators for regenerative gas cycle machinery (specification, page 1)<sup>2</sup>, and not merely an improvement in the field of heat exchange devices in general. Bearing this in mind, it is our view that when claim 1 is read in light of the specification, it

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<sup>2</sup>According to appellant (specification, page 2), prior art high efficiency foil regenerators for regenerative gas cycle machinery are hard to make because they were manufactured from a single large sheet of spiral-wrapped foil, which foil sheet is difficult to fabricate and handle. Appellant's regenerator is said to overcome these problems by providing the layers of the regenerator matrix as a plurality of separate concentric foil layers.

depends for completeness on the preamble recitation "regenerator" such that, in this instance, the term "regenerator" is a limitation on claim 1 and not merely a statement of purpose or use. In other words, the limitations found in the body of the claim are not the only limitations of the claim, and the term "regenerator" in the preamble of claim 1 itself further limits the scope of claim 1 such that every heat exchange device that literally meets the terms of the body of the claim does not necessarily anticipate the claim. To read the claim in light of the specification indiscriminately to cover all types of heat exchangers would be divorced from reality.<sup>3</sup>

Looking at Pauletta, the alleged anticipatory reference, in more detail, this patent pertains to a concentric tube odor eliminator wherein waste gas having noxious constituents is heated to an elevated temperature to oxidize or otherwise transform the noxious constituents to a benign state (column 1,

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<sup>3</sup>It is, of course, well settled that in proceedings before the PTO claims must be given their broadest reasonable interpretation consistent with the specification, and that the claim language cannot be read in a vacuum, but instead must be read in light of the specification as it would be interpreted by one of ordinary skill in the pertinent art. *See, for example, In re Bond*, 910 F.2d 831, 833, 15 USPQ2d 1566, 1567 (Fed. Cir. 1990), *Specialty Composites v. Cabot Corp.*, 845 F.2d 981, 986, 6 USPQ2d 1601, 1604 (Fed. Cir. 1988) and *In re Sneed*, 710 F.2d 1544, 1548, 218 USPQ 385, 388 (Fed. Cir. 1983).

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lines 23-38). Pauletta's apparatus includes a housing 10 in which is located a heat exchanger in the form of a series of concentric tubular members 16 spaced apart from one another to provide therebetween inlet and outlet passageways 17 and 19. These passageways are connected respectively to inlet and outlet ports 12 and 14 by means of a manifold 22 (column 2, lines 1-6). The operation of Pauletta's apparatus is explained in the paragraph spanning columns 2 and 3. Waste gas including noxious constituents to be incinerated enters the apparatus through inlet 12 and is distributed across the concentric tube core of the heat exchanger by the manifold 22. The gas is directed downwardly into the spaces between the tubes 16 and at the bottom of the heat exchanger is directed through a baffle tube 32 towards heating means 24 where the gas is heated to a temperature of about 1500°F to neutralize the noxious constituents. The high temperature gas is then directed into the concentric outlet passageway 19 in heat exchange relation to cooler waste gas entering the heat exchanger. Given this description of the construction and operation of Pauletta, appellant's argument on page 10 of the main brief that in Pauletta the flow of inlet gas is kept separate from the flow of outlet gas, and that the flow

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passages 17 and 19 are bonded and connected to separate headers to provide impermeable barriers to the mixing of the two flows is reasonable.

Turning to appellant's regenerator, in the paragraph spanning pages 9-10 of the specification it is explained that, within the context of a regenerative gas cycle machine, fluid is cycled back and forth through the regenerator such that:

As fluid flows back and forth through regenerator 24, it leaves heat in the regenerator material as it flows in one direction and picks up heat from the regenerator material as it flows back in the other direction. The material of the regenerator must be porous to permit fluid to flow, and the size and shape of the flow passages determines both the effectiveness of heat transfer between regenerator material and fluid and the the [sic] amount of pressure drop experienced by the flow.

The examiner's assertion (answer, page 5) that the device of Pauletta can be used in all the same environments and systems as the claimed device and operate in the same fashion as appellant's claimed device is not well taken. Nothing in Pauletta either expressly or impliedly discusses the use of the Pauletta heat exchanger as a "regenerator" in the sense described in appellant's specification wherein the material of the regenerator itself is porous to permit fluid to flow through the regenerator, and wherein the flow passages of the regenerator are sized and

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shaped to facilitate heat transfer between regenerator material and fluid and the amount of pressure drop experienced by the gas as it flows through the regenerator. In this regard, given that Pauletta's heat exchanger reasonably appears to be constructed with a manifold that keeps the flow of incoming gases separated from the counterflow of outgoing gases, it is questionable whether Pauletta's device is capable of functioning in any meaningful sense to allow a cycling fluid to liberate heat to the material of the flow passages as it flows through the regenerator in one direction and then to pick up heat from the material of the flow passages as the fluid flows back through the regenerator in the opposite direction as described in the paragraph spanning pages 9-10 of appellant's specification. Accordingly, we do not believe one of ordinary skill in the art would consider the heat exchanger of Pauletta to be a "regenerator" as called for in appealed claim 1 when that term is interpreted in light of appellant's specification. While we appreciate that the heat exchange device of Pauletta appears to have all the structure recited in the body of claim 1, the examiner's position (answer, page 5) that the device of Pauletta can be used in all the same

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environments and systems as the claimed device and operate in the same fashion as appellant's claimed device is, at best, speculative.

In light of the above, we consider that the preamble recitation "regenerator" in claim 1 is a limitation on the claimed subject matter, and that Pauletta does not meet this limitation. Accordingly, we will not sustain the standing rejection of claim 1 as being anticipated by Pauletta.

*II. The obviousness rejection of claims 2-5*

Claims 2-5 depend from claim 1 and add that the two edges of a layer of the foil meet each other in an unbonded butt joint (claim 2), that the two edges of a layer of the foil meet each other in an open joint (claim 3), that two edges of a layer of the foil meet each other in an unbonded butt joint and that two edges of a different layer of foil approach each other in an open joint (claim 4), and that each layer of foil has a joint that is radially offset from the joint in an adjacent layer (claim 5).

In rejecting these claims, the examiner has taken the position (answer, page 4) that these additional claim limitations "are considered to be . . . obvious design expedients . . . which do not solve any stated problem or produce any new and/or unexpected result."

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In the present instance, where the examiner has cited no evidence to support his subjective opinion that one of ordinary skill in the art would consider the further limitations found in claims 2-5 to be obvious design expedients, and where the claim limitations in question go to the very essence of appellant's invention (see, for example, the summary of the invention on pages 8-9 of the specification), they may not be dismissed as mere design expedients that solve no stated problem or produce no new or unexpected result. Compare *In re Kuhle*, 526 F.2d 553, 555, 188 USPQ 7, 9 (CCPA 1975) (use of electrical connection which solves *no stated problem* in lieu of those used in the reference held to be obvious matter of design choice within the skill in the art). On this basis, the examiner's rejection of claims 2-5 as being unpatentable over Pauletta cannot be sustained.

Moreover, for the reasons discussed in our treatment of the anticipation rejection of claim 1, the heat exchanger of Pauletta does not meet the "regenerator" limitation found in claims 2-5 by

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way of their dependence from claim 1, thereby providing an additional reason for not sustaining the standing rejection of claims 2-5 based on Pauletta.

*III. The obviousness rejection of claims 6-12*

Claims 6 and 7 depend from claim 1 and claim the regenerator of claim 1 in combination with, respectively, a gas cycle machine equipped with a displacer, and a coaxial pulse tube refrigerator. Claims 8 and 9 depend from claim 1 and add that the regenerator includes, respectively, a generally cylindrical tube disposed inside the innermost layer of foil, and a solid plug disposed inside the innermost layer of foil.

Independent claim 10 reads as follows:

10. In a coaxial pulse tube refrigerator, an improvement comprising a plurality of concentric foil layers wherein outer foil layers are regenerator foil and inner foil layers are smooth foil.

Pauletta, the primary reference in the examiner's rejection of claims 6-10, has been discussed above. Yaron pertains to

compact, high efficiency foil regenerators for use in regenerative gas cycle (e.g., Stirling cycle, Ericsson cycle, Vuilleumier cycle, Gifford-McMahon cycle, Sibling Cycle and similar) cryocoolers, heat engines, refrigerators and heat pumps. Very thin foil us [sic, is] formed in patterns of slits and slots that produce highly efficient regenerators when the foil is stacked in layers as by rolling it upon itself.  
[Abstract.]

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In rejecting claims 6-12 as being unpatentable over Pauletta in view of Yaron, the examiner found (answer, page 4) that Pauletta "discloses all the claimed features of the invention with the exception of the claimed elements in claims 6-9" and that Yaron "discloses a gas cycle machine with a displacer, a coaxial pulse tube refrigerator in combination with a regenerator foil installed in a cylindrical space for the purpose of making and operating a coaxial pulse tube refrigerator." Based on these teachings, the examiner concludes that it would have been obvious to one of ordinary skill in the art in view Yaron to use a displacer in combination with the heat exchanger of Pauletta and/or to operate the heat exchanger of Pauletta as a coaxial pulse tube. The examiner's motivation for these proposed modifications is "for the purpose of making and operating [the device of Pauletta as] a coaxial pulse tube refrigerator as in Yaron et al" (answer, page 4).

Appellant argues (main brief, page 17) that the examiner gives no cogent reason why anyone would think to combine the cited references, and that it makes no sense to do so. We agree. To modify Pauletta in view of the teachings of Yaron to operate as a refrigerator, as proposed by the examiner, would run directly counter to Pauletta's stated purpose of heating waste

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gas to a high temperature in order to eliminate noxious gas constituents therefrom, thus making Pauletta's device, at best, unsuitable for its intended purpose. For this reason, the standing rejection of claim 6-10, as well as claims 11 and 12 that depend from claim 10, as being unpatentable over Pauletta in view of Yaron is not sustainable.

In addition, because we do not consider that the heat exchanger of Pauletta constitutes a "regenerator" as claimed in claim 1, from which claims 6-9 depend, we do not agree with the examiner's determination that Pauletta discloses the claimed subject matter "with the exception of the claimed elements in claims 6-9" (answer, page 4). Accordingly, even if Pauletta were to be modified in the manner proposed by the examiner, the subject matter of claims 6-9 would not result. This constitutes an additional reason why the standing rejection of claims 6-9 is not sustainable.

In light of the above, we will not sustain the standing rejection of claims 6-12 as being unpatentable over Pauletta in view of Yaron.

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*Summary*

The rejection of claim 1 as being anticipated by Pauletta is reversed.

The rejection of claims 2-5 as being unpatentable over Pauletta is reversed.

The rejection of claims 6-12 as being unpatentable over Pauletta in view of Yaron is reversed.

Accordingly, the decision of the examiner finally rejecting the appealed claims is reversed.

*REVERSED*

CHARLES E. FRANKFORT	)	
Administrative Patent Judge	)	
	)	
	)	
	)	
LAWRENCE J. STAAB	)	BOARD OF PATENT
Administrative Patent Judge	)	APPEALS AND
	)	INTERFERENCES
	)	
	)	
JENNIFER D. BAHR	)	
Administrative Patent Judge	)	

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