

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.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. 10

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte CHRISTIAN THOMAS GREGORY

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Appeal No. 2000-1335  
Application 09/131,930

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ON BRIEF

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Before CALVERT, MCQUADE, and GONZALES, Administrative Patent Judges.

MCQUADE, Administrative Patent Judge.

DECISION ON APPEAL

Christian Thomas Gregory appeals from the final rejection of claims 1, 2, 4 through 18 and 20.<sup>1</sup> Claims 3 and 19, the only other claims pending in the application, stand objected to as depending from a rejected base claim.

THE INVENTION

The invention relates to a "radial flow heat exchanger in which the fluid to be heated or cooled flows between an outer

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<sup>1</sup> Claims 1 and 4 have been amended subsequent to final rejection.

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peripheral portion of the heat exchanger, through a plurality of radially extending tubes, and a center hub, the tubes passing through a fin arrangement" (specification, page 1). A copy of the appealed claims appears in the appendix to the appellant's brief (Paper No. 8).

THE EVIDENCE

The items relied on by the examiner as evidence of obviousness are:<sup>2</sup>

|                        |           |               |
|------------------------|-----------|---------------|
| Swan                   | 1,965,011 | Jul. 3, 1934  |
| Modine                 | 2,055,549 | Sep. 29,      |
| 1936                   |           |               |
| Dauvergne              | 5,284,203 | Feb. 8, 1994  |
| Yasuda et al. (Yasuda) | 5,307,867 | May 3, 1994   |
| Obosu et al. (Obosu)   | 5,660,230 | Aug. 26, 1997 |
| Nomura                 | 5,832,994 | Nov. 10, 1998 |

The item relied on by the appellant as evidence of non-obviousness is:

An analytical study undertaken by the appellant, Christian Thomas Gregory, and Dr. Kamal Karimanal comparing rectangular versus radial flow heat exchangers. This study was made of record on August 30, 1999 as part of Paper No. 5.

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<sup>2</sup> The appellant spends a good portion of the brief (Paper No. 8) discussing U.S. Patent No. 2,508,729 to Stein as if it had been, or was going to be, applied to support a rejection. As pointed out by the examiner in the answer (Paper No. 9, see pages 2 and 8), however, Stein has not even been officially made of record. Inasmuch as this reference is not applied to support any of the appealed rejections, it has no relevance thereto and will not be further discussed in this decision. Of course, the examiner is free to take appropriate action should he ultimately decide that Stein is relevant to the patentability of the appellant's claimed invention.

THE REJECTIONS

Claims 1, 2, 5 through 13, 17, 18 and 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nomura in view of Obosu.

Claim 4 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Nomura in view of Obosu and Modine.

Claims 13 and 14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nomura in view of Obosu and Swan.

Claim 15 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Nomura in view of Obosu and Dauvergne.

Claim 16 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Nomura in view of Obosu and Yasuda.

Attention is directed to the appellant's brief (Paper No. 8) and to the examiner's answer (Paper No. 9) for the respective positions of the appellant and the examiner with regard to the merits of these rejections.

DISCUSSION

Nomura, the examiner's primary reference, discloses a heat exchange apparatus designed to efficiently cool large

quantities of fluid such as dry air by inducing turbulence therein. The apparatus 2 includes a heat exchanger flowpassage 10 disposed in a vessel 3 where it is subjected to an external flow of refrigerant (e.g., liquefied nitrogen, oxygen, argon and the like) passing through the vessel. Tubes 11 and 12 supply and discharge the dry air to and from the flowpassage. As described by Nomura,

flowpassage 10 is composed of annular tubes 18 communicated in a circumferential direction which constitute peripheral flowpassages, communicating tubes 19 which constitute communicating flowpassages, a tank 20 on the supply port side, a tank 21 on the discharge port side, and the like, as shown in FIG. 1. Plural rows (5 rows in the illustrated embodiment) of the annular tubes 18 are arranged in a parallel state so as to have a desired spacing in a vertical direction around a vertical axis. The annular tubes 18 adjacent to each other are communicated at plural locations by the communicating tubes 19 in a vertical direction. The communicating tubes 19 in each of upper and lower rows are arranged substantially at equal intervals while being alternately deviated in a peripheral direction to each other so that the positions of an inlet and an outlet at the annular tube 18 in each row are alternately deviated in a peripheral direction, the inlet and the outlet being set so that the inlet and the outlet are not opposed on a straight line. The tank 20 on the supply port side and the tank 21 on the discharge port side are arranged on the lower inside and on the upper inside of the plural rows of the annular tubes 18. The tank 20 on the supply port side is communicated in

its intermediate portion with the lowermost annular tube 18 by means of communicating tubes 22 arranged radially, and the tank 21 on the discharge port side is communicated in its upper end portion with the uppermost annular tube 18 by means of communicating tubes 23 arranged radially. The supply tube 11 is communicated with the bottom of the tank 20 on the supply port side, and the discharge tube 12 is communicated with the bottom of the tank 21 on the discharge port side [column 3, line 41, through column 4, line 4].

Claim 1, the sole independent claim on appeal, recites a radial flow heat exchanger comprising, inter alia, a sealed fluid manifold, a sealed fluid receiving hub spaced interiorly and radially with respect to the manifold, a plurality of separate and spaced fluid flow tubes having respective ends in sealed fluid communication with the manifold and the hub, and a fin assembly positioned between the manifold and hub. In the examiner's view (see pages 3 and 8 through 10 in the answer), Nomura's flowpassage 10 meets all of the limitations in claim 1 except for those pertaining to the fin assembly. Among other things, claim 1 requires the fin assembly (1) to include a heat conducting material which is arranged or disposed at spaced intervals and in a generally annular orientation between the hub and manifold, (2) to have a progressively increasing surface area whereby the maximum

surface area is in the region of the manifold and the minimum surface area is in the region of the hub and (3) to be in intimate heat conducting contact with each of the tubes.

Nomura's flowpassage 10 does not have any sort of fin assembly. The examiner's reliance on Obosu to overcome this deficiency is not well founded.

Obosu discloses a heat exchanger which makes use of fins to enhance heat transfer between an internal flow of refrigerant and an external flow of air. The heat exchanger 10 has a generally planar configuration (see Figure 1) and includes a plurality of heat exchange tubes 12, 12' arranged in vertically aligned rows between manifolds 14, 16, and a series of plate-shaped fins 22, 22' installed on the tubes in closely spaced relation. Each fin consists of a generally planar body 24 having centrally located, linearly arranged apertures 26 for receiving the tubes in one of the vertical rows.

In proposing to combine Nomura and Obosu to reject claim 1, the examiner concludes that it would have been obvious at the time the invention was made to a person having ordinary skill in the art "to employ in Nomura a plurality of fins . .

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. having spaced apertures receiving the tubes [presumably radial tubes 22, 23] for the purpose of increasing surface area and heat exchange as recognized by Obosu et al" (answer, page 4).

Although Obosu certainly teaches the advantages of utilizing fins in conjunction with heat exchange tubes to increase heat exchange efficiency, the heat exchanger disclosed by Obosu differs markedly in overall shape and tube arrangement from that disclosed by Nomura. Given the disparate natures of the two heat exchangers, it is not apparent how or why Obosu's planar tube and fin arrangement would have suggested providing Nomura's radially configured flowpassage 10 with the annularly oriented fin assembly specified in claim 1. We are therefore constrained to conclude that the only suggestion for such a result stems from impermissible hindsight knowledge derived from the appellant's own disclosure.

Thus, the combined teachings of Nomura and Obosu fail to establish a prima facie case of obviousness with respect to

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the subject matter recited in claim 1.<sup>3</sup> Hence, we shall not sustain the standing 35 U.S.C. § 103(a) rejection of claim 1, or of dependent claims 2, 5 through 13, 17, 18 and 20, as being unpatentable over Nomura in view of Obosu.

Inasmuch as Modine, Swan, Dauvergne and Yasuda do not cure the foregoing flaw in the basic Nomura-Obosu combination, we also shall not sustain the standing 35 U.S.C. § 103(a) rejection of dependent claim 4 as being unpatentable over Nomura in view of Obosu and Modine, of dependent claims 13 and 14 as being unpatentable over Nomura in view of Obosu and Swan, of dependent claim 15 as being unpatentable over Nomura in view of Obosu and Dauvergne, or of dependent claim 16 as being unpatentable over Nomura in view of Obosu and Yasuda.

#### SUMMARY

The decision of the examiner to reject claims 1, 2, 4 through 18 and 20 is reversed.

#### REVERSED

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<sup>3</sup> This being so, there is no need to delve into the merits of the appellant's evidence of non-obviousness.

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| IAN A. CALVERT              | ) |                 |
| Administrative Patent Judge | ) |                 |
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|                             | ) | BOARD OF PATENT |
| JOHN P. MCQUADE             | ) |                 |
| Administrative Patent Judge | ) | APPEALS AND     |
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| JOHN F. GONZALES            | ) |                 |
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