

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. 34

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte THOMAS I. INSLEY and RAYMOND P. JOHNSTON

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Appeal No. 2003-0671  
Application No. 09/099,632

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ON BRIEF

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Before ABRAMS, FRANKFORT, and NASE, Administrative Patent Judges.  
ABRAMS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 1-5, 9, 10, 12-24, 31, 32 and 34. Claims 26-30 and 33 have been canceled and claims 6-8, 11 and 25 have been withdrawn as being directed to a non-elected invention.

We REVERSE.

### BACKGROUND

The appellants' invention relates to a heat exchanger. An understanding of the invention can be derived from a reading of exemplary claim 1, which has been reproduced below.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Rosman <u>et al.</u> (Rosman)	4,347,896	Sep. 7, 1982
Phillips <u>et al.</u> (Phillips)	4,894,709	Jan. 16, 1990
Schubert <u>et al.</u> (Schubert)	5,249,359	Oct. 5, 1993
Bae	5,771,964	Jun. 30, 1998

The following rejections stand under 35 U.S.C. § 103(a):

- (1) Claims 1, 21, 31, 32 and 34 on the basis of Phillips.
- (2) Claims 1, 21-23, 31, 32 and 34 on the basis of Bae.
- (3) Claims 1-5, 9, 10, 12-23, 31, 32 and 34 on the basis of Rosman in view of Bae.
- (4) Claims 14 and 24 on the basis of Rosman in view of Bae and Schubert.

Rather than reiterate the conflicting viewpoints advanced by the examiner and the appellants regarding the above-noted rejections, we make reference to the Answer (Paper No. 27) for the examiner's complete reasoning in support of the rejections, and to the Brief (Paper No. 26) and Reply Brief (Paper No. 28) for the appellants arguments thereagainst.

### OPINION

In reaching our decision in this appeal, we have given careful consideration to the appellants' specification and claims, to the applied prior art references, and to the respective positions articulated by the appellants and the examiner. As a consequence of our review, we make the determinations which follow.

The appellants' invention relates to heat exchangers that include a microchanneled structured surface defining small discrete channels for active flow of a heat transfer medium. The microstructure is replicated onto inexpensive but versatile polymeric films to define flow channels. According to the appellants, the resulting heat exchanger offers a number of advantages over those of the prior art, including the fact that they can wholly or partially be flexible and thus provide a high heat transfer area to the object to be acted upon. The invention is set forth in independent claim 1 in the following manner:

1. A heat exchanger for use with active fluid transport, comprising:

(a) a first layer of polymeric film material having first and second major surfaces, wherein the first major surface includes a structured surface having a plurality of flow channels that extend from a first point to a second point along the surface of the first layer and that have a minimum aspect ratio of the channel's length to its hydraulic radius of about 10:1 and a hydraulic radius<sup>1</sup> of no greater than about 300 micrometers;

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<sup>1</sup>Wettable cross-sectional area of a channel divided by its wettable channel circumference (specification, page 15)

(b) a first cover layer that overlies at least a portion of the structured polymeric surface and includes a closing surface to cover at least a portion of the plurality of flow channels to make plural substantially discrete flow passages; and

(c) a manifold in fluid communication with the substantially discrete flow passages to allow a potential from a potential source to promote fluid movement through the passages from a first potential to a second potential, such fluid movement for thermally affecting the first cover layer of material for promoting heat transfer between the moving fluid and the first cover layer.

*Rejection (1)*

Claims 1, 21, 31, 32 and 34 stand rejected as being obvious in view of Phillips.

The test for obviousness is what the teachings of the applied prior art would have suggested to one of ordinary skill in the art. See, for example, In re Keller, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981). In establishing a prima facie case of obviousness, it is incumbent upon the examiner to provide a reason why one of ordinary skill in the art would have been led to modify a prior art reference or to combine reference teachings to arrive at the claimed invention. See Ex parte Clapp, 227 USPQ 972, 973 (Bd. Pat. App. & Int. 1985). To this end, the requisite motivation must stem from some teaching, suggestion or inference in the prior art as a whole or from the knowledge generally available to one of ordinary skill in the art and not from the appellants' disclosure. See, for example, Uniroyal, Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044, 1052, 5 USPQ2d 1434, 1439 (Fed. Cir.), cert. denied, 488 U.S. 825 (1988).

With regard to independent claim 1, the examiner finds all of the subject matter recited in the claim to be disclosed by Phillips, “but [Phillips] does not disclose the first layer being a polymeric film material.” However, it is the examiner’s view that it would have been an obvious design choice to one of ordinary skill in the art to modify Phillips by replacing the disclosed heat exchange material with a polymeric film because “it is within the general skill of a worker in the art to select a known material on the basis of suitability for the intended use.” The examiner is of the further view that it would have been obvious to make the “plate” disclosed by Phillips “of any desired thickness to achieve a desired heat exchange or pressure strength” (Answer, page 5), which we take to mean to make it so thin as to be a film.

Phillips is directed to a device for cooling high power electronic devices such as integrated circuits. It comprises a heat sink 100 and a cover plate 130 that cooperate to define a plurality of flow channels 114. The materials disclosed by Phillips for the heat sink are gallium arsenide, germanium, indium phosphide, silicon, aluminum, copper and silver (column 11, lines 59-61). There is nothing in the reference which suggests that the heat sink can be made of film, much less polymeric film, and it would appear from the disclosure that the entire device is of rigid construction, considering that the cover is described as being a “plate” (column 8, line 23) and the heat sink as a “solid material” (column 15, line 21).

We agree with the appellants that it would not have been obvious to make the first layer (the heat sink) of the Phillips heat exchanger of polymeric film. The appellant has selected polymeric film because it can conform to contours and thus provide better conductivity, and because it typically is less expensive than the materials used in the prior art devices, can be accurately formed with a microstructured surface into flow channels, has reduced thermal expansion and contraction characteristics, is compression conformable into the contours of a substrate, is non-corrosive, thermo-chromatic and electrically non-conductive, and has a wide range of thermal conductivity (specification, page 9). In our opinion, these reasons constitute evidence that the appellants' selection of polymeric material in the form of a film from the multitude of available materials was not merely "obvious design choice," as the examiner has opined. We also cannot agree with the examiner that the reduction of the thickness of the Phillips' "plate" to the point where it becomes a "film" falls within the purview of obviousness to one of ordinary skill in the art. Phillips discloses a solid construction and, as the appellants have pointed out on pages 22 and 23 of the Brief, the common applicable definition of "plate" is a smooth, flat, relatively thin rigid body of uniform thickness and "film" is a thin, generally flexible sheet of material. To substitute film for the Phillips structure would necessitate a complete reconstruction of the disclosed device, which would appear to substantially alter or destroy the Phillips invention and

thus in our view would have operated as a disincentive to one of ordinary skill in the art to so do.

The mere fact that the prior art structure could be modified does not make such a modification obvious unless the prior art suggests the desirability of doing so. In re Gordon, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984). In the present case, we fail to perceive any teaching, suggestion or incentive which would have led one of ordinary skill in the art to modify the Phillips heat exchanger in the manner proposed by the examiner except for the hindsight afforded one who first viewed the appellants' disclosure. Hindsight, of course, cannot form the basis for a rejection. In re Fritch, 972 F.2d 1260, 1264, 23 USPQ2d 1780, 1784 (Fed. Cir. 1992).

It therefore is our conclusion that Phillips fails to establish a prima facie case of obviousness with regard to the subject matter of claim 1, and we will not sustain this rejection, or the like rejection of claims 31, 32 and 34, which depend from claim 1.

Independent claim 21 contains the same limitations in describing a method of transferring heat between a heat transfer fluid and another media. On the basis of the reasoning explained above with regard to claim 1, we also will not sustain the rejection of claim 21 on the basis of Phillips.

*Rejection (2)*

Claims 1, 21-23, 31, 32 and 34 stand rejected as being obvious in view of the teachings of Bae. As was the case with the rejection based upon Phillips, the examiner admits that Bae fails to disclose or teach that the first layer is a polymeric film, and then takes the position that the use of polymer material, as well as its use as a film, would have been obvious matters of design choice to one of ordinary skill in the art (Answer, page 5).

Bae is directed to a fin-type heat exchanger in which the components are made of metal, such as aluminum and copper (column 4, lines 50-51 and 60). There is no teaching in Bae that the components are in the form of films, and from the drawings it would appear they are of substantially rigid metal (see, for example, Figure 3). This rejection cannot be sustained for the same reasons as were propounded above with regard to the first rejection. Bae does not establish a prima facie case of obviousness with regard to independent apparatus claim 1 and dependent claims 31, 32 and 34, or with regard to independent method claim 21 and dependent claims 22 and 23.

### *Rejection (3)*

The examiner here rejects claims 1-5, 9, 10, 12-23, 31, 32 and 34 as being unpatentable over Rosman in view of Bae. It is the examiner's view that Rosman discloses all of the subject matter of claim 1 except for the film material and the specific hydraulic radius and aspect ratio. However, the examiner takes the position that the hydraulic radius and aspect ratio are taught by Bae and it would have been obvious to

construct the Rosman heat exchanger in accordance with these values. The examiner again considers that to employ a film instead of a plate would have been obvious to the artisan.

Rosman is directed to "plate/fin-type heat exchangers" (column 1, lines 7 and 8). In keeping with this, Rosman discloses a "basic unibody, one piece fin plate 10" which defines a series of channels 20, and a "cover plate 15" which closes the open tops of the channels (column 4, line 30 et seq.). Rosman teaches that "various thermally conductive materials can be used," such as "metals, ceramics, polymers etc." (column 8, lines 43-46). Rosman makes no mention of utilizing a film to construct the fin plate. We agree with the appellants that the extent of the teaching provided by Rosman to one of ordinary skill in the art would be to form of solid rigid polymer material the fin plate and the cover plate, which quite clearly are disclosed as being solid and rigid. As was our opinion with regard to this issue in the other two rejections of claim 1 et al., we fail to perceive any teaching or suggestion which would have motivated one of ordinary skill in the art to construct the Rosman heat exchanger of polymer film. In this regard, the examiner has not explained how this would be accomplished, and it seems to us that such an attempt would necessitate a wholesale reconstruction of the Rosman devices, which would be a disincentive to make the proposed changes.

Further consideration of the teachings of Bae, which was applied for teaching the claimed aspect ratio and hydraulic radius, fails to alleviate the defect in the rejection regarding the use of film instead of the solid components disclosed in Rosman.

We conclude that these references fail to establish a prima facie case of obviousness with regard to the subject matter of claim 1, and this rejection cannot be sustained. Nor can we sustain the rejections of claims 2-5, 9, 10, 12-23, 31, 32 and 34, which were on the same basis.

#### *Rejection (4)*

Claim 14, which depends from claim claims 12 and 9, and claim 24, which depends from claim 21 through claim 22, stand rejected as being unpatentable over Rosman in view of Bae, taken further with Schubert. Claim 14 adds the limitation that the flow channels of adjacent heat exchange layers are aligned substantially perpendicular to each other. Claim 24 adds the additional step of spacing the cover of one layer from that of the adjacent media. Schubert was applied to the combination of references for teaching these features. Be that as it may, Schubert does not overcome the deficiency in Rosman and Bae regarding the substitution of film for solid structure, and this rejection will not be sustained.

#### CONCLUSION

None of the rejections are sustained.

The decision of the examiner is reversed.

NEAL E. ABRAMS  
Administrative Patent Judge

CHARLES E. FRANKFORT  
Administrative Patent Judge

JEFFREY V. NASE  
Administrative Patent Judge

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