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 GREGORY T. KOHLER and EDWARD A. ROBINSON

Appeal 2006-3265
Application 10/047,670
Technology Center 3700

Decided: May 30, 2007

Before TERRY J. OWENS, MURRIEL E. CRAWFORD, and JENNIFER D. BAHR, *Administrative Patent Judges*.

BAHR, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Gregory T. Kohler and Edward A. Robinson (Appellants) appeal under 35 U.S.C. § 134 from the Examiner's decision rejecting claims 1, 5, 8, 11, and 13. Claims 2 and 15 stand withdrawn from consideration and claims

3, 4, 6, 7, 9, 10, 12, and 14 stand objected to as depending from a rejected claim. We have jurisdiction over this appeal under 35 U.S.C. § 6 (2002).

Appellants' claimed invention is directed to a tank and cap assembly for microchannel tubing in heat exchangers (Specification 1). The assembly utilizes a cap having a slot therein through which the microchannel tubing is inserted and a tank for receiving the cap therein (Specification 7 and 8). All surfaces of the tank are free of braze clad or alloy, but the cap has braze clad material on both its interior and exterior surfaces. Thus, when the tubing, cap and tank are assembled as illustrated in Fig. 2 and subjected to a brazing temperature, the braze cladding will flow to bond and seal the exterior surface of the tubing with the cap within the slot and to seal the interface of the cap with the tank. (Specification 9-10.) With Appellants' assembly, because braze clad or alloy is located only on the cap, in a region away from the end of the tubing, braze clad or alloy is unlikely to migrate to the end of the tubing and plug any of the ports or channels therein (Specification 13). Independent claim 1 is illustrative of the claimed subject matter and reads as follows:

> 1. A heat exchanger, comprising:
>
> a flattened tube including a port extending to an end of the tube;
>
> a cap having a generally centrally located slot sized to snugly receive said end and allow said tube to pass fully through said slot, said cap having a body in which said slot is formed and having an exterior surface nominally concentric with said slot, said exterior surface having a tube facing side and an opposite side spaced therefrom, the periphery of said cap at said tube facing side being larger than the periphery at said opposite side; and

> a tank having a body with a cap receiving end, a fluid receiving or discharging end spaced from the cap receiving end, an interior cavity opening to said cap receiving end, and a port extending from said cavity at a location remote from said cap receiving end to a location at or near said receiving or discharging end, said cavity having a stepped wall including a first section sized to snugly receive said cap tube facing side, a second section spaced from said first section and sized to abut said tube end without blocking the internal port thereat, and an intermediate section between said first and second sections and sized to abut said cap at a location between said tube facing side and said opposite side when said tube facing side is received in said first section;
>
> said tank receiving said cap with said intermediate section acting as a cap stop to limit entry of said cap into said tank and said second section acting as a tube stop limiting entry of said tube end into said cavity.

The Examiner relies upon the following as evidence of unpatentability:

Kocher	US 2,134,719	Nov. 01, 1938
Brogan	US 3,923,323	Dec. 02, 1975
Turner	US 4,146,254	Mar. 27, 1979
Dalo	US 4,945,983	Aug. 07, 1990
Ryan	US 5,062,476	Nov. 05, 1991
Ando	US 5,105,877	Apr. 21, 1992

Appellants seek review of the Examiner's rejection of claims 1, 5, 8, 11, and 13 under 35 U.S.C. § 103(a) as being unpatentable over Kocher, Brogan, or Turner in view of Dalo, Ryan, or Ando.[1]

The Examiner provides reasoning in support of the rejection in the Answer (mailed March 27, 2006). Appellants present opposing arguments in the Appeal Brief (filed January 25, 2006) and Reply Brief (filed May 22, 2006).

DISCUSSION

Appellants do not dispute that, if any of the primary references were combined with any of the secondary references as proposed by the Examiner, the subject matter of the rejected claims would result. Accordingly, the issue before us in this appeal is whether it would have been obvious to utilize the compression coupling technique of Kocher, Brogan, or Turner to couple oval or flattened heat exchanger tubes, of the type discussed by Dalo, Ryan, or Ando, to heat exchanger structure to arrive at the subject matter of Appellants' claims. Appellants contend that none of the primary references is reasonably pertinent to the particular problem with which Appellants were concerned, because they are directed toward removable, round tube couplings, rather than to a brazed, and thus non-removable, heat exchanger construction using a flat tube, and that there is

[1] The Examiner's application of so many prior art references in the alternative hardly seems consistent with the instruction in *Manual of Patent Examining Procedure* (*MPEP*) § 706.02 that "[p]rior art rejections should ordinarily be confined strictly to the best available art …. Merely cumulative rejections, i.e., those which would clearly fall if the primary rejection were not sustained, should be avoided."

nothing in the primary references that would have logically commended them to an inventor's attention in considering the problem faced by Appellants (Appeal Br. 4). Thus, according to Appellants, the Examiner has improperly used hindsight in combining the references "simply to find the specific structural description given for the tank and cap components in the claims" (Appeal Br. 4). Appellants further contend the secondary references Dalo, Ryan, and Ando teach away from their use in the coupling arrangements of the primary references Kocher, Brogan, and Turner, because the secondary references concern flattened tubes brazed to a header, while the primary references teach removable couplings for round tubes (Appeal Br. 5). Appellants additionally contend, in effect, that the structural differences between flattened or oval tubes and round tubes are such that the type of compression used in forming the couplings of Kocher, Brogan, and Turner is not possible with the flat tubes of Dalo, Ryan, and Ando (Appeal Br. 6).

Appellants are correct that none of the primary references Kocher, Brogan, and Turner specifically addresses heat exchanger tubes. On the other hand, there is nothing in Kocher, Brogan, and Turner that would have discouraged one of ordinary skill in the art from utilizing the disclosed coupling techniques to couple heat exchanger tubes to heat exchanger structure. Further, while the Brogan technique, which involves *rotation* of nut portion 14 of element 12 to urge sleeve portion 13 into constrictive retention with the tube T (Brogan, col. 4, ll. 27-30; tube labelled "P" in the only attached drawing), would not appear to be suitable for application to a non-round, or flattened, tube, we find nothing in either of the coupling techniques of Kocher and Turner which would seem to make it unsuitable

for a flattened tube of the type discussed by Dalo, Ryan, and Ando, for example. Appellants argue that the compression involved in the primary references would not be possible with flattened tubes, which do not have the same hoop strength and resilience as round tubes, because the flattened tubes would begin to collapse under the pressure (Appeal Br. 6) but provide no evidence that this is the case. An artisan must be presumed to know something about the art apart from what the references disclose (*see In re Jacoby*, 309 F.2d 513, 516, 135 USPQ 317, 319 (CCPA 1962)) and the conclusion of obviousness may be made from "common knowledge and common sense" of the person of ordinary skill in the art (*see In re Bozek*, 416 F.2d 1385, 1390, 163 USPQ 545, 549 (CCPA 1969)). Moreover, skill is presumed on the part of those practicing in the art. *See In re Sovish*, 769 F.2d 738, 743, 226 USPQ 771, 774 (Fed. Cir. 1985). "A person of ordinary skill is also a person of ordinary creativity, not an automaton." *KSR Int'l. Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1742, 82 USPQ2d 1385, 1397 (2007). Such a person would have understood that the deformation-causing compression of Kocher's technique (Kocher 2, col. 1, ll. 43-49; Fig. 1) and the lock ring bite of Turner's technique (Turner, col. 3, l. 68 to col. 4, l. 7) must not exceed the force or deformation that the tube can withstand without collapse or damage and would have been able to design the tube with the necessary wall thickness and other structural supports to avoid collapse in a coupling of the type taught by Kocher or Turner.

As for Appellants' contention that the primary references are not reasonably pertinent to the particular problem with which Appellants were concerned, because they are not directed to flattened heat exchanger tubes

with brazed connections and thus would not have commended themselves to an inventor's attention in considering the problem faced by Appellants,

> [w]hen a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, §103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.

KSR Int'l., 127 S.Ct. at 1740, 82 USPQ2d at 1396. We must ask whether the improvement is more than the predictable use of prior art elements according to their established functions. *Id*.

Further, in making a determination with regard to obviousness, we should not limit ourselves to looking only at the problem Appellants were trying to solve. The question is not whether the combination was obvious to Appellants but whether it was obvious to a person with ordinary skill in the art. Thus, "[u]nder the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed." *KSR Int'l.*, 127 S.Ct. at 1742, 82 USPQ2d at 1397.

In the present case, all of the references applied by the Examiner are directed to tube couplings and, thus, by their very nature, present many of the same problems and issues. Turner's coupling arrangement offers the advantage that it "will not only serve to couple metallic and non-metallic substantially rigid tubing but also flexible tubing which can be used at

elevated temperatures and pressures without slipping or becoming disconnected from its coupler" (Turner, col. 1, ll. 30-35). Kocher's coupling arrangement is particularly adapted for mass production, is self-aligning and devoid of cocking tendencies, and effects a particularly secure and fluid-tight connection (Kocher 1, col. 1, ll. 32-36 and col. 2, l. 51 to col. 2, l. 1). One skilled in the art at the time of Appellants' invention would have recognized that the advantages offered by the coupling arrangements of Turner and Kocher would likewise be applicable to tube couplings in heat exchangers, which need to be fluid-tight and may be subjected to elevated temperatures and pressures. Moreover, as discussed above, the modifications necessary to utilize the coupling arrangement of either Turner or Kocher in a heat exchanger to couple flattened heat exchanger tubes to the header or tank structure of the heat exchanger would have been well within the skill of a person of ordinary skill in the art with predictable results and with the flattened heat exchanger tubes of any of Dalo, Ryan, and Ando, the heat exchanger structure, and the coupling connection of Turner or Kocher performing their established functions.

We do not agree with Appellants that the secondary references Dalo, Ryan, and Ando teach away from the combination of the flattened heat exchanger tubes and the tube coupling arrangement of Kocher or Turner. "A reference may be said to teach away when a person of ordinary skill, upon [examining] the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant." *In re Gurley*, 27 F.3d 551, 553, 31 USPQ2d 1130, 1131 (Fed. Cir. 1994). Simply that there are differences between two references is insufficient to establish that such references

"teach away" from any combination thereof. *See In re Beattie*, 974 F.2d 1309, 1312-13, 24 USPQ2d 1040, 1042 (Fed. Cir. 1992). There is nothing in Dalo, Ryan, or Ando that would have discouraged one of ordinary skill in the art from utilizing a coupling of the type taught by Kocher or Turner, neither of which involves brazing, in the heat exchanger to couple the heat exchanger tubes to the tank structure. The couplings of Kocher and Turner appear to be adapted to provide secure and fluid-tight connections and would serve the same function in a heat exchanger environment. Appellants make much of the fact that the Kocher and Turner couplings do not involve brazing and are removable, while the couplings of Dalo, Ryan, and Ando are brazed, and thus non-removable, but we note that Ryan, for example, brazes the tubes 18 to the header plates 26, 28 (Ryan, col. 3, ll. 6-16; Fig. 2), but does not braze the header plates 26, 28 to the tank 14. Rather, once the tubes are seated against stop tabs 50, 52 of tank 14, the headers 26, 28 are fastened in place by bending the extensions 60 of the tank 14, as illustrated in Fig. 2. (Ryan, col. 4, ll. 34-39) Further, while the combination proposed by the Examiner might change a heat exchanger structure from one wherein the tubes are not removable from the tank structure to one wherein the tubes are removable, there is no indication in the applied prior art that such a change would be undesirable, unsuitable, or unpredictable, and Appellants have not supplied any evidence that would so indicate.

For the above reasons, we conclude that Appellants have not demonstrated that the Examiner erred in determining that it would have been obvious to utilize either of the compression coupling techniques of Kocher and Turner to couple oval or flattened heat exchanger tubes, of the type discussed by Dalo, Ryan, or Ando, to heat exchanger structure and thus

arrive at the subject matter of Appellants' claims. Accordingly, the rejection is sustained.

SUMMARY

The decision of the Examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv) (2006).

AFFIRMED

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