

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 32

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte JENS S. SORENSEN

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Appeal No. 96-2649  
Application 08/418,875<sup>1</sup>

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ON BRIEF

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Before MEISTER, FRANKFORT and McQUADE, Administrative Patent Judges.

McQUADE, Administrative Patent Judge.

DECISION ON APPEAL

This appeal is from the final rejection of claims 1 through 20 and 22 through 28, all of the claims pending in the

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<sup>1</sup> Application for patent filed April 7, 1995. According to appellant, the application is a continuation of Application 08/150,286, filed November 10, 1993, now abandoned, which is a continuation of Application 07/884,003, filed May 18, 1992, now abandoned.

application.

The invention relates to "a method of manufacturing a fluid conduit such as an integrated or integral manifold, for example for use in a heat exchanger, comprising a hollow body having on the exterior thereof a plurality of integral, longitudinally spaced hollow risers" (specification, page 1). Claim 1 is illustrative and reads as follows:

1. A method of manufacturing a tubular member having integral exterior protrusions, said method comprising:

providing a hollow element having therein an axially extending interior defined by a surrounding wall having a thickness varying circumferentially;

positioning said hollow element within a die having therein lateral voids; and

subjecting said hollow element at said interior thereof to deformation pressure by sequentially forcing a member through said interior of said hollow element and thereby causing a non-elastic forced flow of material of a thicker portion of said wall in an axial direction and then in lateral directions outwardly into said voids in said die, thus forming said hollow element into a tubular member having on the exterior thereof a plurality of solid protrusions that are spaced axially of said tubular member and that are not continuous circumferentially of said tubular member.

The references relied upon by the examiner as evidence of anticipation and obviousness are:

Portal et al. (Portal)	3,436,948	Apr. 8, 1969
Clausen	4,663,812	May 12, 1987

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The appealed claims stand rejected as follows:

- a) claims 1, 13, 14, 16, 17, 22 and 23 under 35 U.S.C. § 102(b) as being anticipated by Portal;
- b) claims 2 through 12, 15, 18 through 20 and 28 under 35 U.S.C. § 103 as being unpatentable over Portal; and
- c) claims 24 through 27 under 35 U.S.C. § 103 as being unpatentable over Portal in view of Clausen.

Reference is made to the appellant's main and reply briefs (Paper Nos. 27 and 29) and to the examiner's final rejection and answer (Paper Nos. 24 and 28) for the respective positions of the appellant and the examiner with regard to the merits of these rejections.

Portal, the examiner's primary reference, pertains to the production of a heat-transfer tube having longitudinal groups of fins which are inclined to the axis of the tube. The fins in each group are inclined in a direction opposite to those in the two adjacent groups to form a "herringbone" fin pattern (see column 1, lines 31 through 44). By way of background, Portal explains that

[t]he fabrication of tubes provided with fins which are inclined to the axis and especially of tubes with "herringbone" fins gives rise to difficulties. The machining of fins of this type by means of the usual methods which call for the use of machine tools

is often difficult. It has already been proposed to form tubes of this type by drawing an expander plug through a tubular workpiece so as to force the metal of the tube wall into grooves formed in an external tubular die. Unfortunately, the rubbing friction of the expander plug against the internal surface of the tubular workpiece draws the metal and results in deformation of the fibers which is detrimental to the resistance of the fins when these latter are subjected to the action of a flow of gas at high temperature [column 1, lines 45 through 57].

To solve the foregoing problems, Portal proposes

a method of fabrication of tubes having a smooth internal surface and an external surface which is provided with fins inclined to the axis of the tube, said method consisting in placing a tubular workpiece within a die which is made up of a series of finned elements each designed to reproduce an angular sector of said fins, in then exerting a substantially radial stress on said workpiece in a zone of application which is displaced axially from one end to the other of said workpiece so as to cause a predetermined thickness of said workpiece to creep into the die while at the same time limiting the pressure of air which is enclosed between said die and the fins progressively as said fins penetrate within said die [column 2, lines 1 through 14].

The step of exerting a substantially radial stress on the workpiece to force metal into the fin-forming cavities of the die is performed by a frusto-conical expander head 24 having recesses in which are fitted balls 26. A drive mechanism imparts to the expander head a swash-plate motion having an axial translational component and a rotational component (see column 3, lines 37

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through 46). As described by Portal,

[p]rogressively as the head 24 penetrates within the workpiece, the balls 26 expand the metal of which said workpiece is formed and cause the said metal to creep into the grooves of the [die] shells 4. If special precautions were not taken, the rubbing contact of the head would tend to draw the metal of the internal portion of the workpiece in the longitudinal direction. This would be the case if the frusto-conical head were to bear directly against the workpiece and if said head were endowed solely with a movement of translation.

. . .  
In accordance with the present invention, the head is fitted with rolling members consisting in the form of embodiment shown of balls 26 which reduce the rubbing friction of the tube and virtually transform the action of the head into a radial stress within the workpiece. The swash-plate motion of the head which imposes on the rolling members an oblique movement relatively to the axis limits to an even greater extent the longitudinal effort which is exerted on the internal portion of the workpiece [column 4, lines 3 through 29].

We shall not sustain the standing 35 U.S.C. § 102(b) rejection of independent claim 1, or of claims 13, 14, 16, 17, 22 and 23 which depend therefrom, as being anticipated by Portal.

Anticipation is established only when a single prior art reference discloses, expressly or under principles of inherency, each and every element of a claimed invention. RCA Corp. v. Applied Digital Data Sys., Inc., 730 F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir. 1984).

Claim 1 recites a method of manufacturing a tubular member

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having integral exterior protrusions comprising, inter alia, the step of subjecting a hollow element to deformation pressure by sequentially forcing a member through its interior and thereby causing a non-elastic forced flow of material "in an axial direction and then in lateral directions" outwardly into voids in a die. The appellant's contention that the method disclosed by Portal fails to meet this limitation (see pages 12 through 15 in the main brief and pages 3 through 5 in the reply brief) is well taken. Portal's description of this method makes no mention of a forced flow of material in an axial direction. Indeed, it is clearly Portal's intention to eliminate such axial flow. In this light, the examiner's finding that Portal's step of "forcing the material outwardly into the fin grooves of the die would necessarily require axial flow of the material in the wall zone between the fin grooves" (final rejection, page 2) is unduly speculative. Under principles of inherency, when a reference is silent about an asserted inherent characteristic, it must be clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Continental Can Co. v. Monsanto Co., 948 F.2d 1264, 1268, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991). As the court stated in In re Oelrich, 666 F.2d 578,

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581, 212 USPQ 323, 326 (CCPA 1981)(quoting *Hansgirg v. Kemmer*,  
102 F.2d 212, 214, 40 USPQ 665, 667 (CCPA 1939)):

Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing *may* result from a given set of circumstances is not sufficient. [Citations omitted.] If, however, the disclosure is sufficient to show that the natural result flowing from the operation as taught would result in the performance of the questioned function, it seems to be well settled that the disclosure should be regarded as sufficient.

In the present case, Portal's disclosure falls far short of providing the factual basis required to support the examiner's finding that the method described therein necessarily involves an axial flow of material. While the flow of material in the Portal method would likely have an axial component, this is not sufficient to meet the claim 1 limitation requiring flow "in an axial direction and then in lateral directions."

We shall not sustain the standing 35 U.S.C. § 103 rejections of dependent claims 2 through 12, 15 and 18 as being unpatentable over Portal or the standing 35 U.S.C. § 103 rejections of dependent claims 24 through 27 as being unpatentable over Portal in view of Clausen. These rejections must fall because they are predicated on the examiner's faulty determination that Portal's method meets the foregoing limitation in parent claim 1 requiring a forced flow of material in an axial direction.

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We shall sustain, however, the standing 35 U.S.C. § 103 rejection of claims 19, 20 and 28, which depend from claim 1, as being unpatentable over Portal. These claims further define the deformation member recited in claim 1 as being a mandrel having certain characteristics. According to the examiner,

Portal et al. discloses a mandrel having rotary elements which are actuated in a helical motion, and advises that such actuation produces a superior product than prior mandrels which merely comprise an expander plug with axial actuation which undesirably draws the material axially. See column 1, lines 49 to 58. However, to employ an expander plug with axial actuation, as required by Claims 19, 20 and 28, in the manner stated by Portal et al. to be known, rather than the rotary expander suggested by Portal et al. is considered to be an obvious exercise of mechanical design [final rejection, page 3].

The appellant does not dispute that this proposed modification would meet the mandrel limitations in claims 19, 20 and 28. Instead, the appellant essentially argues that Portal teaches away from such a modification (see pages 21 through 24 in the main brief and pages 9 through 11 in the reply brief). This line of argument is not persuasive. All of the disclosures in a reference must be evaluated for what they fairly teach one of ordinary skill in the art, even when these teachings are phrased in terms of a non-preferred embodiment or as being unsatisfactory for the intended purpose. In re Boe, 355 F.2d 961, 965, 148 USPQ

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507, 510 (CCPA 1966). Although Portal teaches that the rotatable expander plug or mandrel disclosed therein produces a product which is superior to that produced by the non-rotating expander plug or mandrel discussed in the background portion of the disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the non-rotatable expander plug in the Portal method to produce a lower grade product.

The foregoing modification of the Portal method also would meet all of the limitations in parent claim 1. It goes without saying that the rubbing friction and longitudinal movement of the non-rotatable expander plug or mandrel would result in non-elastic forced flow of the tubular workpiece material "in an axial direction and then in lateral directions" as recited in claim 1. Also, and notwithstanding the appellant's arguments to the contrary (see pages 10 through 12 in the main brief and pages 1 through 3 in the reply brief), Figure 1 of the Portal reference clearly shows that fins 2 constitute "a plurality of solid protrusions that are spaced axially of said tubular member and that are not continuous circumferentially of said tubular member" as recited in claim 1.

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The following rejections are entered pursuant to 37 CFR § 1.196(b).

Claims 1 through 3, 5, 6, 8 through 11, 13, 14, 16 through 18, 22 and 23 are rejected under 35 U.S.C. § 103 as being unpatentable over Portal applied as discussed above in connection with the examiner's rejection of claims 19, 20 and 28.

As indicated above, the modified Portal method would meet all of the limitations in independent claim 1. In addition, and notwithstanding the appellant's arguments to the contrary (see pages 15 and 16 in the main brief and pages 5 and 6 in the reply brief), Portal's Figure 1 clearly shows that the solid protrusions or fins 2 are arranged in plural axial rows spaced circumferentially, thereby meeting the limitations in dependent claims 22 and 23. Furthermore, and again notwithstanding the appellant's arguments to the contrary (see pages 16 through 18 in the main brief and pages 5 and 6 in the reply brief), it would have been obvious to one of ordinary skill in the art as a simple matter of common sense to use a hollow element having a circular outer configuration in transverse cross section as recited in claims 3 and 11 in the modified Portal method to form a heat exchange tube having a conventional circular configuration. Finally, the appellant does not dispute that Portal teaches or

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would have suggested a method meeting the limitations in dependent claims 2, 5, 6, 8 through 10, 13, 14 and 16 through 18.

Claims 24 through 27 are rejected under 35 U.S.C. § 103 as being unpatentable over Portal, applied as discussed above in connection with the examiner's rejection of claims 19, 20 and 28, and further in view of Clausen.

Clausen discloses a method of manufacturing a heat exchange manifold "comprising a hollow body having a plurality of hollow risers for connection to heat exchanger tubes" (column 1, lines 7 through 9). As summarized by Clausen, the method includes

providing [a] hollow shape with a plurality of individual risers each having a substantially solid [cylindrical] cross-section. Subsequently, the risers are re-shaped by means of a reverse impact extrusion process into hollow [cylindrical] risers. Finally, by perforating the wall of the hollow shape under the hollow risers, apertures are provided constituting inlets connecting the cavity of the hollow shape with the individual hollow risers" (Abstract).

The starting hollow shape with the plurality of solid cylindrical risers is produced by an extrusion or drawing step followed by a cold forming pressing step (see column 3, lines 5 through 20).

It would have been obvious to one of ordinary skill in the art to further modify the Portal method by configuring the die to form a plurality of individual risers each having a substantially solid cylindrical cross-section and by adding a reverse impact

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extrusion hollowing step and a cutting step in order to form a heat exchange manifold of the sort disclosed by Clausen without the necessity of Clausen's cold forming pressing step. Thus, the appellant's contention that this proposed combination of references is based on impermissible hindsight (see pages 24 through 26 in the main brief and pages 11 and 12 in the reply brief) is not convincing.

As a final matter, we would note that the arguments in the main and reply briefs that the applied prior art would not have suggested the subject matter recited in claims 4, 7, 12 and 15 are persuasive.

In summary:

a) the decision of the examiner to reject claims 1 through 20 and 22 through 28 is affirmed with respect to claims 19, 20 and 28, and reversed with respect to claims 1 through 18 and 22 through 27; and

b) new rejections of claims 1 through 3, 5, 6, 8 through 11, 13, 14, 16 through 18, and 22 through 27 are entered pursuant to 37 CFR § 1.196(b).

In addition to affirming the examiner's rejection of one or more claims, this decision contains new grounds of rejection pursuant to 37 CFR § 1.196(b)(amended effective Dec. 1, 1997, by

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final rule notice, 62 Fed. Reg. 53,131, 53,197 (Oct. 10, 1997),  
1203 Off. Gaz. Pat. & Trademark Office 63, 122 (Oct. 21, 1997)).  
37 CFR § 1.196(b) provides, "A new ground of rejection shall not  
be considered final for purposes of judicial review."

Regarding any affirmed rejection, 37 CFR § 1.197(b)  
provides:

(b) Appellant may file a single request for rehearing  
within two months from the date of the original  
decision . . . .

37 CFR § 1.196(b) also provides that the appellant, WITHIN  
TWO MONTHS FROM THE DATE OF THE DECISION, must exercise one of  
the following two options with respect to a new ground of  
rejection to avoid termination of proceedings (37 CFR § 1.197(c))  
as to the rejected claims:

(1) Submit an appropriate amendment of the claims  
so rejected or a showing of facts relating to the  
claims so rejected, or both, and have the matter  
reconsidered by the examiner, in which event the  
application will be remanded to the examiner. . . .

(2) Request that the application be reheard under  
§ 1.197(b) by the Board of Patent Appeals and  
Interferences upon the same record. . . .

Should the appellant elect to prosecute further before the  
Primary Examiner pursuant to 37 CFR § 1.196(b)(1), in order to  
preserve the right to seek review under 35 U.S.C. §§ 141 or 145  
with respect to the affirmed rejection, the effective date of the

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affirmance is deferred until conclusion of the prosecution before the examiner unless, as a mere incident to the limited prosecution, the affirmed rejection is overcome.

If the appellant elects prosecution before the examiner and this does not result in allowance of the application, abandonment or a second appeal, this case should be returned to the Board of Patent Appeals and Interferences for final action on the affirmed rejection, including any timely request for reconsideration thereof.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED-IN-PART; 37 CFR § 1.196(b)

JAMES M. MEISTER	)	
Administrative Patent Judge	)	
	)	
	)	
	)	
CHARLES E. FRANKFORT	)	BOARD OF PATENT
Administrative Patent Judge	)	APPEALS AND
	)	INTERFERENCES
	)	
	)	
JOHN P. McQUADE	)	
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