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opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.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. 27

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DAVID W. SCHULZ

Appeal No. 99-0158
Application 08/616,787[1]

ON BRIEF

Before COHEN, McQUADE and BAHR, Administrative Patent Judges.

McQUADE, Administrative Patent Judge.

DECISION ON APPEAL

David W. Schulz appeals from the final rejection of

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[1] Application for patent filed March 15, 1996 as a 37 CFR § 1.62 file wrapper continuation of Application 08/228,488, filed April 15, 1994, now abandoned. Both the appellant and the examiner may wish to look into discrepancies in the record involving the March 15, 1996 filing date assigned to the instant application. This filing date appears to be subsequent to abandonment date of Application 08/228,488.

claims 1, 5, 9 through 11 and 23. Claims 2 and 3, the only other claims pending in the application, stand withdrawn from consideration pursuant to 37 CFR § 1.142(b). We reverse.

The invention relates to "superplastic forming of tubular structures, and more particularly to end sealing of a tubular blank of superplastic material in preparation for superplastic forming to the final shape" (specification, page 1). A copy of the appealed claims appears in the appendix to the appellant's main brief (Paper No. 25).

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

Macha	2,861,530	Nov. 25, 1958
Fields, Jr. et al. (Fields)	3,340,101	Sept. 5, 1967
Greacen	3,900,939	Aug. 26, 1975
Miller et al. (Miller)	5,022,135	Jun. 11, 1991

The claims stand rejected under 35 U.S.C. § 103(a) as follows:

a) claims 1, 10 and 23 as being unpatentable over Fields in view of Greacen;

b) claim 5 as being unpatentable over Fields in view of Greacen and Macha; and

c) claims 9 and 11 as being unpatentable over Fields in

view of Greacen and Miller.

Reference is made to the appellant's brief (Paper No. 25) and to the examiner's answer (Paper No. 26) for the respective positions of the appellant and the examiner with regard to the merits of these rejections.

Fields, the examiner's primary reference, pertains to the superplastic formation of various metal products. Of particular interest is the subject matter depicted in Figure 3. As described by Fields,

> FIGURE 3 shows apparatus for forming tubular blank metal stock TB, having inner and outer principal opposed surfaces TB_1 and TB_2, respectively, into the expanded contour of die surface or shaping member 20 formed in a die body 21. The shaping member 20 is provided with vents or bleeds holes 22 in the female sections as described in connection with FIGURES 1 and 2. One end of the tubular blank metal TB, defining a first continuous edge thereof, is clamped against the die body 21 and blocked against fluid transmission by a plug member 23. The opposite end of the tubular blank metal TB, defining a second continuous edge thereof, is also clamped against the die body 21 by a plug member 24, but fluid communication therethrough is provided for the introduction of a fluid pressure loading from a suitable source (not shown) attached to conduit 25. . . . It will be noted that the constrained two separate continuous edges of the tubular blank TB

> define a closed periphery circumscribing that portion of the surface area of the blank TB which is in lateral operative projection with the die surface or shaping member 20. The shaping member 20 adjacent the plug members 23 and 24 is provided with relief radii 26 to minimize initial stress concentrations. The final shape of the part formed by the apparatus of FIGURE 3 is shown by broken line *a* [column 5, lines 27 through 55].

With additional regard to the process involved, Fields states that

> [f]ull performance of our discovered process requires that the metal blank be heated or otherwise conditioned to exhibit its effective strain rate sensitivity as indicated above and placed in the apparatus provided in operative projection with an opposed die portion. Tensile deforming stress is then induced in the blank by application of a load through a fluid pressure interface. . . . Loading is continued until the blank has deformed against and into intimate contact with the shaping member or die surface [column 6, lines 30 through 41].

As conceded by the examiner (see page 4 in the answer), Fields does not meet the limitations in independent claims 1, 10 and 23 requiring the end caps to have a coefficient of thermal expansion greater than that of the tube. As explained in the appellant's specification, and as set forth to some extent in claims 1 and 10, this difference in the coefficients of thermal expansion produces a gas-tight seal between the end

caps and the tube when the assembly is heated to the superplastic forming temperature of the tube. Fields makes no mention of the coefficients of thermal expansion of the tube (tubular blank TB) and end caps (plug members 23 and 24) disclosed therein, or of any heat-induced gas-tight seal between the tube and end caps.

The examiner's reliance on Greacen to overcome these deficiencies is not well taken.

Greacen discloses an element 20 designed to plug a defective tube in a heat exchange apparatus to avoid the necessity of removing the apparatus from service to replace or repair the tube. To this end, the plug is made of a shape memory alloy "whereby it can be physically deformed into a reduced diameter for insertion into the tube end and thereafter induced to assume its original diameter to thus secure the plug within the tube" (Abstract). Greacen explains that

> there is provided a method of plugging a defective tube by means of a plug formed from the above material comprising the steps of forming the plug

> with an external diameter greater than the internal diameter of the tube to be plugged; heating the plug to the prescribed temperature for imparting its "memory" configuration; thereafter cooling the same to a temperature below the minimum limit of the transition range of temperatures for the plug material where the plug is imparted with its "intermediate" configuration. Thereafter the plug is applied to the tube to be plugged and heated to a temperature above the upper limit of its transition range whereby the tube is caused to attempt to assume its memory configuration and in so doing is expanded into tight plugging engagement within the tube interior [column 2, lines 18 through 33].
>
> According to the examiner,
>
> even though Greacen fails to expressly state that the plug has a higher coefficient of thermal expansion than
>
> that of the tube, Greacen is considered to stand for such a proposition because it recognizes that the thermal properties of two members can be utilized to expand one member relative to the other.
>
> Because one having ordinary skill in the art recognizes that the most efficient use of the Fields' apparatus could be realized if the pressurizing fluid was not allowed to escape from the ends of the tube, one would have found it obvious to employ the tube plugging method of Greacen in the process of Fields in order to ensure that no pressurizing fluid is allowed to escape [from] the ends of the tube while the tube is being deformed thereby. When the tube plugging method of Greacen is incorporated into the process of Fields, the end caps will press the tube ends against the internal die surface.

> If it is determined that Greacen does not at least suggest that the plug has a higher coefficient of thermal expansion than that of the tube, then the claimed relative coefficients of thermal expansion of the tube and end caps is deemed to be a matter of design choice because such relative coefficients of thermal expansion per se solve no stated problem nor serve any apparent purpose insofar as the claimed method is concerned [answer, pages 5 and 6].

As correctly pointed out by the appellant (see pages 9 and 10 in the brief), however, Greacen contains no teaching or suggestion relevant to the coefficient of thermal expansion limitations recited in claims 1, 10 and 23. The examiner's conclusion to the contrary is completely unfounded. As also pointed out by the appellant (see page 9 in the brief), the use

of plugs of the sort disclosed by Greacen to cap the ends of Fields' tube would apparently require the plugs to be cut from the tube at the end of the forming operation. This would certainly seem to be a disincentive which would have discouraged one of ordinary skill in the art from combining the two references in the manner proposed by the examiner. Furthermore, the record in the instant application,

particularly the appellant's specification, belies the examiner's contention that the thermal expansion features recited in claims 1, 10 and 23 do not solve a stated problem or serve any purpose.

In light of the foregoing, we are satisfied that the combined teachings of Fields and Greacen would not have suggested the subject matter recited in independent claims 1, 10 and 23 to one of ordinary skill in the art. Accordingly, we shall not sustain the standing 35 U.S.C. § 103(a) rejection of these claims.

Since neither Macha nor Miller cures the foregoing flaws in the basic Fields/Greacen combination, we also shall not sustain the standing 35 U.S.C. § 103 rejections of dependent claims 5, 9 and 11.

The decision of the examiner is reversed.

REVERSED

IRWIN CHARLES COHEN Administrative Patent Judge	)	
JOHN P. McQUADE Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
JENNIFER D. BAHR Administrative Patent Judge	)	

Appeal No. 99-0158
Application 08/616,787

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