

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opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.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. 25

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte YOSHIHIDE SHIBANO

Appeal No. 1995-3349
Application No. 08/066,994¹

HEARD: November 2, 1999

Before OWENS, WALTZ, and KRATZ, Administrative Patent Judges.

KRATZ, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's refusal to allow claims 1, 5 and 7, which are all of the claims pending in this application.

BACKGROUND

¹ Application for patent filed May 25, 1993.

The appellant's invention is directed to a method for cleaning workpieces of foreign matter attached thereto by oil via immersion in a deaerated aqueous treating solution (2-5 ppm dissolved oxygen content), which solution is ultrasonically vibrated. Burrs are removed in the same (claim 1) or a second cleaning tank (claim 7). An understanding of the invention can be derived from a reading of exemplary claims 1 and 7, which are reproduced below.

1. A method of ultrasonically cleaning a workpiece, said workpiece having foreign matter attached thereto by oil, comprising the steps of:

deaerating a non-chlorofluorocarbon aqueous cleaning solution containing a surface active agent to a dissolved oxygen content ranging from 2 to 5 ppm;

heating said cleaning solution to a temperature ranging from 30° to 55° C;

supplying an ultrasonic cleaning tank having an ultrasonic vibrator mounted on a bottom thereof with said aqueous cleaning solution which has been deaerated to said dissolved oxygen content;

immersing a workpiece in said cleaning solution; and

radiating ultrasonic energy from the ultrasonic vibrator into the cleaning solution to remove said foreign matter attached to said workpiece by oil, and burrs, off the workpiece.

7. A method of ultrasonically cleaning a workpiece, comprising the steps of:

deaerating a first non-chlorofluorocarbon aqueous cleaning solution to a first dissolved oxygen content ranging from 2 to 5 ppm for removing solid foreign matter attached to said workpiece by oil;

deaerating a second non-chlorofluorocarbon aqueous cleaning solution to a second dissolved oxygen content different from said first dissolved oxygen content and ranging from 0.01 to 5 ppm for removing burrs from said workpiece;

heating said first and second aqueous cleaning solutions to a temperature ranging from 30° to 55° C;

supplying a first ultrasonic cleaning tank having an ultrasonic vibrator mounted on a bottom thereof with said first aqueous cleaning solution which has been deaerated to said first dissolved oxygen content;

supplying a second ultrasonic cleaning tank having an ultrasonic vibrator mounted on a bottom thereof with said second aqueous cleaning solution which has been deaerated to said second dissolved oxygen content;

immersing a workpiece in said first cleaning solution in said first ultrasonic cleaning tank;

radiating ultrasonic energy from the ultrasonic vibrator in the first cleaning tank to remove said solid foreign matter attached to said workpiece by oil off the workpiece;

immersing said workpiece in said second cleaning solution in said second cleaning tank; and

radiating ultrasonic energy from the ultrasonic vibrator in the second cleaning tank to remove said burrs off the workpiece.

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

Zucker 1961	2,977,962	Apr. 4,
Young et al. (Young) 1980	4,193,818	Mar. 18,
Shibano et al. (Shibano) 13, 1990	4,907,611	Mar.

Claims 1, 5 and 7 stand rejected under 35 U.S.C. § 103 as being unpatentable over Shibano in view of Young and Zucker.

OPINION

We have carefully reviewed the respective positions and evidence advanced by appellant and the examiner. In so doing, we find ourselves in agreement with appellant that the examiner has failed to establish that the applied references' teachings would have rendered the claimed subject matter obvious within the meaning of 35 U.S.C. § 103. Accordingly, we will not sustain the examiner's rejection.

Shibano discloses an ultrasonic cleaning method using a degassed (deaerated) cleaning liquid bath for immersing workpieces to be cleaned therein, with deaeration enhancing cavitation in the ultrasonically agitated liquid bath and hence

the cleaning of the workpieces by removing oil and other soil therefrom (column 1, lines 5-10 and column 2, lines 35-54). Shibano teaches the cleaning liquid may be selected from among a small group of listed materials including water (column 8, lines 22-28, column 9, lines 40-44, and column 11, lines 43-47). Moreover, Shibano indicates that the cleaning liquid may be heated to about 47°C in a heater (column 8, lines 64-68). Each of Young and Zucker also teach degassing (deaerating) an aqueous cleaning solution via application of a vacuum to enhance cavitation and cleaning of objects that are immersed in the cleaning solution that is ultrasonically vibrated.

The examiner acknowledges that Shibano does not disclose the specifically claimed cleaning liquid dissolved oxygen contents (answer, page 4). According to the examiner, however, it would have been obvious to one of ordinary skill in the art to arrive at the claimed cleaning process including the claimed dissolved oxygen contents from the combined references' teachings which clearly suggest deaerating the cleaning liquid is advantageous in enhancing cavitation in the cleaning fluid bath and the cleaning of the objects immersed therein. Implicit in the examiner's rejection is the notion that one

skilled in the art would reasonably have been following the suggested prior art deaeration teachings in balancing the degree and cost of deaeration with the disclosed benefits of enhanced cleaning in arriving at the claimed deaeration (dissolved oxygen content) ranges.

We note that the examiner's rejection (answer, pages 3-5), as further explained above, appears to be a reasonable presentation of a *prima facie* case of obviousness of the subject matter of appealed claim 1.² However, it is our opinion that the evidence of obviousness furnished by the examiner is outweighed by the countervailing arguments (brief, pages 15-17 and evidence (specification, Example 2 and Figure 3) furnished by appellant. Appellant contends that the prior art teachings relied upon by the examiner when considered in light of the entirety of the present record lack a suggestion to use the claimed deaeration levels. In this regard, the claimed deaeration levels are urged to be considerably above the maximum obtainable and most likely suggested for cavitation

² Dependent claim 5 has not been separately argued. Accordingly, the patentability of claim 5 rises or falls with claim 1.

purposes and have been found to enhance removal of foreign matter that is attached to a workpiece by oil. Example 2 of the specification and Figure 3 substantiate appellant's argument regarding the discovery of a deaeration level operating range that engenders results that would not have been expected from the prior art teachings on this record. In this regard, we note that Figure 3 indicates that better cleaning of oil attached matter would result at deaeration levels representing relatively higher dissolved oxygen contents, which is at odds with the applied references' teachings. We observe that the examiner's rebuttal argument indicating that the applied references teach removing "substantially all gas" (answer, page 6) does not refute the above-noted position of appellant. On this record, we are constrained to agree with appellant's viewpoint.

Additionally, with regard to separately argued claim 7, it is our opinion that the examiner has not adequately explained how the applied references would have reasonably suggested the sequential use of two tanks containing cleaning solutions of different dissolved oxygen contents in cleaning a workpiece. The examiner's mere notation that Shibano discloses multiple

washing stages (answer, pages 4 and 5) does not address the recited differing dissolved oxygen limitations of claim 7. Accordingly, we conclude that the examiner has not met the initial burden of presenting a *prima facie* case of obviousness regarding the subject matter of claim 7.

In light of the above, we cannot sustain the examiner's stated rejection.

CONCLUSION

To summarize, the decision of the examiner to reject claims 1, 5 and 7 under 35 U.S.C. § 103 as being unpatentable over Shibano in view of Young and Zucker is reversed.

REVERSED

TERRY J. OWENS)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
THOMAS A. WALTZ)	APPEALS
Administrative Patent Judge)	AND
)	INTERFERENCES
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PFK/jlb

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