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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* YUKIAKI NAGATA, RYOJI MURATSUBAKI,  
MASANORI KANEMITSU, and MASASHI TSUNEMOTO

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Appeal 2019-006135  
Application 13/476,677  
Technology Center 3700

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Before JOHN C. KERINS, DANIEL S. SONG, and BRETT C. MARTIN,  
*Administrative Patent Judges.*

KERINS, *Administrative Patent Judge.*

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant<sup>1</sup> appeals from the Examiner's decision to reject claims 1, 3, 6, and 13–15, the only claims now pending in the application. We have jurisdiction under 35 U.S.C. § 6(b). A telephonic oral hearing was conducted on August 19, 2020, with Scott M. Schulte, Esq., appearing on behalf of Appellant.

We REVERSE.

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<sup>1</sup> The term “Appellant” is used herein to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as SUGINO MACHINE LIMITED. Appeal Br. 1.

THE CLAIMED SUBJECT MATTER

Appellant's invention relates to a laser machining apparatus. Claim 1 is illustrative, and is reproduced below:

1. A laser machining apparatus for machining with a laser beam that is guided to a machining point by a liquid, comprising:
  - a nozzle including a nozzle inlet opening, the nozzle jetting a jet liquid column;
  - a rectifying chamber having an annular shape, the rectifying chamber attenuating disturbances in flow of the liquid;
  - a liquid oscillating chamber having a generally cylindrical shape with a height greater than its diameter, the liquid oscillating chamber guiding the liquid to the nozzle inlet opening;
  - an oscillating chamber inlet port arranged at only one arc portion of a circumference of a sidewall of the oscillating chamber that allows inflow of the liquid from the rectifying chamber from one direction of the liquid oscillating chamber, the one direction being a radial direction of the oscillating chamber;
  - a laser oscillator generating a laser beam;
  - a focusing optical system focusing the laser beam generated by the laser oscillator above the nozzle inlet opening to cause the jet liquid column to guide the laser beam;
  - a window opposed the nozzle inlet opening to cause the laser beam transmitting from the focusing optical system to enter the liquid oscillating chamber,
  - only one oscillating chamber inlet path for guiding the liquid from the rectifying chamber to the oscillating chamber inlet port, the oscillating chamber inlet path connected directly with the oscillating chamber inlet port and the rectifying chamber, the oscillating chamber inlet path extending horizontally, having a fan shape in view from the window and extending downward from the rectifying chamber, such that the liquid flows in from the only one portion of the circumference of the sidewall of the liquid oscillating chamber; and

wherein the liquid oscillating chamber increases a surface wave on an outer surface of the jet liquid column to cause the jet liquid column jetted from the nozzle onto a workpiece to be easily atomized at the machining point, and

wherein the rectifying chamber surrounds at least a portion of the liquid oscillating chamber.

### THE REJECTIONS

The Examiner rejects:

(i) claims 1, 3, 6, and 13–15 under 35 U.S.C. § 112, second paragraph, as being indefinite; and

(ii) claims 1, 3, 6, and 13–15 under 35 U.S.C. § 103(a) as being unpatentable over Muratsubaki (US 2009/0084765 A1, published Apr. 2, 2009) in view of Koseki (US 7,705,266 B2, issued Apr. 27, 2010) and Kaga (US 5,609,781, issued Mar. 11, 1997).

### ANALYSIS

#### *Claims 1, 3, 6, and 13–15--§ 112 Indefiniteness*

The Examiner finds that the limitation in claim 1 reciting “the only one portion of the circumference of the sidewall” lacks sufficient antecedent basis, thus rendering the claim indefinite. Final Act. 2. This recitation differs from a previous recitation of “only one arc portion of a circumference of a sidewall” in that it omits the term “arc.”

Appellant argues that the objected-to language does not render the claim indefinite, in that it would be understood that “the only one portion” is referring back to the limitation reciting “only one arc portion.” Appeal Br.

7. The Examiner replies that the two recitations are “not the same,” and repeats that the objected-to language lacks proper antecedent basis. Ans. 8.

Although the phrases are not the same, as observed by the Examiner, a person of ordinary skill in the art would understand, within the context of the claim as a whole, that the objected-to language is referring back to the previously-recited “one arc portion.” The absence of exact correspondence in language would not give rise to a question as to the scope of the claim, such that the claim does not reasonably apprise those skilled in the art as to the utilization and scope of the invention. *In re Packard*, 751 F.3d 1307, 1313 (Fed. Cir. 2014).

The rejection of claims 1, 3, 6, and 13–15 as being indefinite is not sustained.

*Claims 1, 3, 6, and 13–15--§ 103(a)--Muratsubaki/Koseki/Kaga*

The Examiner applies a combination of Muratsubaki and Koseki as teaching all limitations in independent claim 1, except for recitations that the oscillating chamber inlet port is arranged at only one arc portion of a circumference of a sidewall of the liquid oscillating chamber, and that the sole inlet path to the oscillating chamber has a fan shape and extends downwardly so that liquid flows into the liquid oscillating chamber from only one side of the circumference of the sidewall of the liquid oscillating chamber. Final Act. 5.

The Examiner cites to Kaga as teaching a laser machining apparatus having an oscillating chamber inlet port having two partitions attached to a plate formed in a fan shape that provide only one oscillating chamber inlet path, such that fluid flows in from only one side of the circumference of the

side wall of the oscillating chamber. Final Act. 5–6, citing principally Kaga, Figs. 37A, 37B, and partitions 35b shown therein. The Examiner concludes that it would have been obvious to modify the oscillating chamber inlet port/path of Muratsubaki (interconnecting channel 82) to “provide an oscillating chamber inlet path having a fan shape for liquid flow from only one arc side of a circumference of a sidewall of the liquid oscillating chamber, as disclosed by Kaga,” so as to allow for easy regulation of the amount of liquid entering the oscillating chamber, to thereby regulate the size of the liquid column surrounding the laser beam. *Id.* at 6.

Figures 37A and 37B of Kaga are reproduced below for ease of reference in the ensuing discussion.

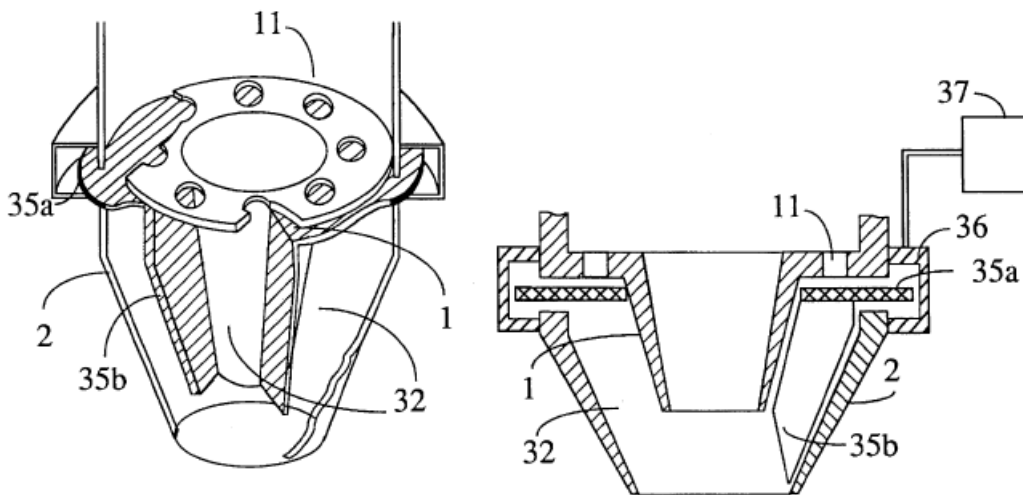


FIG. 37 A

FIG. 37 B

Depicted on the left above is Figure 37A of Kaga, which is a partial cross-sectional perspective view of a machining head. Depicted on the right above is Figure 37B of Kaga, which is a longitudinal cross-sectional view of the same machining head. Kaga, col. 5, ll. 34–37.

Appellant argues that partitions 35b in Kaga divide an annular gas flow channel into two “rooms” (reference numeral 32 with two lead lines),

but that this Kaga construction still allows gas flow through both rooms, i.e., two flow paths and not the claimed only one inlet path, with the gas flow extending completely around the circumference of the flow channel. Appeal Br. 11–12. Appellant explains that, via the use of fan-shaped plate 35a, to which partitions 35b are attached and from which they extend downwardly, gas flows directly into a smaller room bounded by the partitions and unrestricted by plate 35a, but that gas also flows into the larger room separated from the smaller room by the partitions, along a path that is partially obstructed by plate 35a. *Id.*, citing Kaga, Fig. 37A, col. 15, ll. 1–31.

Appellant additionally argues that it is not entirely clear how the Examiner proposes to modify Muratsubaki in view of Kaga, and that it is particularly unclear how Muratsubaki could be modified in view of Kaga so as to result in the structure recited in claim 1, which requires an oscillating chamber inlet port arranged at only one arc portion of a circumference of a side wall of the oscillating chamber, and requires that there be only one inlet path to the oscillating chamber. Appeal Br. 14.

The Examiner responds that claim 1 is not limited “to having only one arc portion or only one oscillating inlet port, it just indicates that there is an oscillating chamber inlet port arranged at only one arc portion (at a specific arc portion) of the circumference of a sidewall of the oscillating chamber.” Ans. 11–12. The Examiner additionally clarifies the proposed modification as involving “placing elements 35a/b of Kaga in element 82 of Muratsubaki so it only allows flow from element 81 of Muratsubaki thru element 32 of Kaga.” Ans. 12. In further responding, it is apparent that the Examiner is of the understanding that, in the construction illustrated in Figure 37A of Kaga,

fluid flow is confined to only one path or room bounded by partitions 35b and unrestricted at the top by plate 35a. *See* Ans. 13–14.

Appellant has the better position here. In discussing the operation of the nozzle depicted in Figures 37A and 37B, Kaga discloses that:

The sub assist gas flows into the small rooms **32** formed by the partition plates **35b**, the inside wall of the sub assist gas nozzle **2** and the outside wall of the main assist gas nozzle **1**, *through the small holes 11 where the small holes 11 are not interrupted by the fan shaped plate 35a*, and goes out from the sub assist gas nozzle outlet. Accordingly, a similar effect to that of the embodiment **17** is obtained by controlling the small rooms to be located behind the machining direction.

Kaga, col. 15, ll. 23–31 (italics added, except in reference numerals). This is the passage cited by the Examiner in finding that fluid flow is confined to only the smaller room or path 32.

The italicized language in the passage quoted above, at first blush, appears to support the Examiner’s position. However, the reference to obtaining a similar effect to that of “embodiment **17**” in Kaga, as well as a review of the drawings and Kaga’s reference to sub assist gas flowing into “the small rooms **32**,” plural, cast doubt on that interpretation.

Embodiment 17 of Kaga is described at column 14, lines 23–67, and accompanying Figures 33A, 33B, and 34–36. Kaga discusses that, in this embodiment, which has four chambers or rooms each supplied by a separate supply inlet, “the assist gas flow speed distribution at the outlet of the sub assist gas nozzle can be adjusted freely by adjusting the quantity of gas flow that is supplied to each small room.” Kaga, col. 14, ll. 43–46. In connection with this description, Kaga references Figure 36, which, although a side view, appears to show sub assist gas exiting at different flow rates or pressures from a plurality of the small rooms. This is consistent with Kaga’s



description of adjusting the gas flow to each small room; Kaga does not appear to discuss or contemplate shutting off the gas flow to all but one of the four rooms and providing only one flow path for the sub assist gas.

In obtaining a “similar effect” with the embodiment illustrated in Figures 37A and 37B, Kaga appears to be influencing sub assist gas flow through the nozzle; with a mostly unrestricted flow through the portion (one of rooms 32) of the nozzle where holes 11 are not interrupted by fan shaped plate 35a, and with a more restricted flow path to reach the portion (the other of rooms 32) of the nozzle where fan shaped plate 35a obstructs the remainder of holes 11. It is possible, though we believe not likely, that Figures 37A and 37B omit various sealing measures spanning all of the illustrated gaps that would strictly limit gas flow to only the former path. However, in that this embodiment is designed to achieve a similar effect to Embodiment 17, which provides a sub assist gas flow around an entire circumference, albeit with different flow characteristics in different sectors, it is more likely than not that Kaga provides two flow paths to two rooms 32 in the embodiment of Figures 37A and 37B.

Accordingly, even though it might be possible to install partitions connected to a fan shaped upper plate, as disclosed in Kaga, into interconnecting channel 82 of Muratsubaki in a manner that would fully restrict passage of liquid to liquid reservoir chamber 83 to only between the partitions where the upper plate is not present, i.e., so that only one oscillating chamber inlet path would be present, Kaga provides no indication as to why that manner of installation would be of any particular significance in the Kaga device, let alone in the Muratsubaki device. The Examiner’s proffered reasoning, that it would allow for easy regulation of the amount of

liquid entering the oscillating chamber, to regulate the size of the liquid column, seems to not be particularly related to restricting flow to a particular path around less than the entire circumference of the oscillating chamber, and also seems to be something that the Muratsubaki device would be able to accomplish without the proposed modification.

To the extent that the Examiner may have relied on Embodiment 17 of Kaga separately from the embodiment of Figures 37A and 37B, as opposed to relying on the two embodiments in conjunction with one another, the above discussion addresses why that embodiment is deficient as well. Final Act. 5–6; Ans. 13.

The rejection of claims 1, 3, 6, and 13–15 as being unpatentable over Muratsubaki, Koseki, and Kaga, is not sustained.

#### DECISION

The rejection of claims 1, 3, 6, and 13–15 under 35 U.S.C. § 112, second paragraph, as being indefinite, is reversed.

The rejection of claims 1, 3, 6, and 13–15 under 35 U.S.C. § 103(a) is reversed.

#### CONCLUSION

In summary:

<b>Claims Rejected</b>	<b>35 U.S.C. §</b>	<b>Reference(s)/Basis</b>	<b>Affirmed</b>	<b>Reversed</b>
1, 3, 6, 13–15	112, second paragraph	Indefiniteness		1, 3, 6, 13–15
1, 3, 6, 13–15	103(a)	Muratsubaki, Koseki, Kaga		1, 3, 6, 13–15

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<b>Claims Rejected</b>	<b>35 U.S.C. §</b>	<b>Reference(s)/Basis</b>	<b>Affirmed</b>	<b>Reversed</b>
<b>Overall Outcome</b>				1, 3, 6, 13–15

REVERSED