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EXAMINER

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ERIC STORHOK, ZHENG XU, JIANWEN YI,
GOPICHANDRA SURNILLA, and JIM HILDITCH

Appeal 2010-008326
Application 11/675,528
Technology Center 3700

Before: PHILLIP J. KAUFFMAN, MICHAEL L. HOELTER, and
HYUN J. JUNG, *Administrative Patent Judges*.

KAUFFMAN, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134 from a rejection of claims 1 and 3-10. Appellants' representative presented oral argument on November 5, 2012. We have jurisdiction under 35 U.S.C. § 6(b). We reverse.

Background

By a submittal dated June 8, 2009, the same day as Appellants' Appeal Brief, Appellants sought to cancel claims 2 and 11-19, and alter claim 5 to depend from claim 1 instead of claim 2.¹

Appellants state the proffered amendment was intended to reduce the issues on appeal and place the application in better condition for appeal. App. Br. 6. Further, Appellants expressed intent to pursue claims 1 and 3-10 and not pursue claims 2 and 11-19. *See* App. Br. 5 (identifying claims 1 and 3-10 as pending and under appeal); *see also* App. Br. 7-8 (not addressing the subject matter of independent claim 11); App. Br. 10-16 and Reply Br. 2-6 (presenting no arguments for claims 2 and 11-19). Thus, we consider claims 2 and 11-19 withdrawn from the appeal, and suggest the Examiner cancel these claims upon return of jurisdiction of this application to the Examiner. *See* MPEP § 1215.03.

The Invention

Independent claim 1 is the sole independent claim on appeal, and is reproduced below:

¹ We find no evidence in the record that this amendment was entered or denied entry.

1. A method for starting an internal combustion engine having direct fuel injection into a cylinder, comprising:

under selected conditions during an engine start, directly injecting fuel to the cylinder at least twice, only for a first combustion event from the engine start, where at least one of the said two injections at least partially occurs during a compression stroke.

The Rejections

The following rejections are before us on appeal:

1. Claim 1 under 35 U.S.C. § 102(b) as anticipated by Fukasawa (US 2006/0243243 A1; pub. Nov. 2, 2006).
2. Claims 3-9 under 35 U.S.C. § 103(a) as unpatentable over Fukasawa.
3. Claim 10 under 35 U.S.C. § 103(a) as unpatentable over Fukasawa and Wiebicke (US 2,305,801, iss. Dec. 22, 1942).

OPINION

Claim 1 as anticipated by Fukasawa

Independent method claim 1 calls for, inter alia, directly injecting fuel into the cylinder at least twice for a first combustion event from the engine start. The plain language of claim 1 requires that the first combustion event from engine start involve directly injecting fuel into the cylinder at least twice.

Appellants' Specification describes that, under some conditions, it can be desirable to have multiple injections during a first combustion event from the start, yet multiple injections for the second or subsequent combustion events may degrade performance. Spec. 7:17-19; *see also* App. Br. 8

(identifying this portion of the disclosure as related to the claimed subject matter.); Reply Br. 2-5 (construing the claim in like manner). Further, the Specification provides an example of the first combustion event from engine start involving at least two direct injections of fuel. *See* Spec. 15:6-10, 17-19; fig. 5 (a first combustion event for condition 2, fourth column, involves two injections, “C:C”, and subsequent combustion events involve a single injection, “C” or “I”); *see also* App. Br. 10-11. Therefore, the Specification is consistent with the interpretation that independent claim 1 calls for the first combustion event from engine start to involve at least two direct injections of fuel.

The Examiner found that Fukasawa discloses directly injecting fuel into the cylinder at least twice (split injection²) for a first combustion event from engine start as called for in claim 1. Ans. 3 (referring, *inter alia*, to Fukasawa, fig. 2, row (e)), 25 (referring to Fukasawa, para. [0059]; fig. 5, S301).³

Appellants argue that, “Fukasawa fails to show using the double injection of Row (e) during a first combustion event from the engine start.” App. Br. 12. Specifically, according to Appellants, Fukasawa utilizes split injection only under certain conditions and those conditions exclude the first combustion event. *Id.*

We agree with the Examiner that Fukasawa identifies a split injection pattern that injects fuel twice for a single combustion event during the compression stroke. *See* Fukasawa, paras. [0021], [0043]; fig. 2 (row (e)),

² Split injection refers to multiple injections per cylinder cycle. *See* Fukasawa, para. [0011], fig. 2, row (e).

³ The context of the second and third rejection demonstrates reliance on this finding in the first rejection. *See* Ans. 4, 11.

fig. 5 (S301, S305). However, Fukasawa does not explicitly disclose that operating in split injection mode is possible for the first combustion event from engine start as claimed. Fukasawa, *passim*. Rather, Fukasawa discloses that split injection is possible only when each of three conditions are met, and when any of the three conditions are not met, split injection is determined to be impossible. Fukasawa, para. [0045], [0050]. The three conditions are: engine rotation speed within a specified range, engine torque (engine load) within a predetermined range, and the fuel injection valve being normal. Fukasawa, paras. [0046]-[0048]. Fukasawa does not disclose the breadth of these conditional predetermined ranges for engine rotation speed and engine torque. Fukasawa, *passim*. Without these criteria, we cannot find that it is more likely than not that these criteria would be met for a first combustion event from start.⁴ Thus, the Examiner has not established by a preponderance of the evidence that Fukasawa anticipates the claimed method. Accordingly, we do not sustain the rejection of claim 1.

Claims 3-9 as unpatentable over Fukasawa

Claims 3-9 depend from independent claim 1.

The Examiner found that Fukasawa discloses that the injection pattern of split injection can be arbitrarily changed in accordance with the engine operation state, and that split injection may be utilized if deterioration of the combustion state is sensed or predicted. Ans. 4, 10 (citing Fukasawa, para. [0043]). In light of this, the Examiner concluded that it would have been

⁴ The Examiner does not address these three pre-conditions for split injection. Ans. *passim*.

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obvious to modify Fukasawa regarding injection for subsequent combustion events (events after the first combustion event from engine start). *Id.*

We agree with the Examiner that Fukasawa discloses that the injection pattern of split injection can be arbitrarily changed in accordance with the engine operation state, and that split injection may be utilized if deterioration of the combustion state is sensed or predicted. *See* Fukasawa, para. [0011], [0043]. However, these disclosures do not alter the criteria for when split injection is permitted, as discussed in the analysis of claim 1, *supra*. Thus, this rejection suffers from the same shortcoming as that of the first rejection.

Claim 10 as unpatentable over Fukasawa and Wiebicke

Claim 10 depends from claim 1. This rejection relies upon Wiebecke for a modification to Fukasawa's method unrelated to utilization of at least two direct injections of fuel during the first combustion event from engine start. *See* Ans. 11. Thus, this rejection suffers from the same shortcoming as that of the first rejection.

DECISION

We reverse the Examiner's decision to reject claims 1 and 3-10.

REVERSED

Klh