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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte CHARLES DEAN, MANUEL ANGEL GONZALEZ DELGADO,
and MICHAEL J. LUCIDO

Appeal 2016-006429
Application 13/556,709
Technology Center 3700

Before WILLIAM A. CAPP, MICHAEL L. WOODS, and
LEE L. STEPINA, *Administrative Patent Judges*.

CAPP, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants¹ seek our review under 35 U.S.C. § 134 of the final rejection of claims 1–19. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

¹ Appellants identify GM Global Technology Operations LLC as the real-party-in-interest. Appeal Br. 2.

THE INVENTION

Appellants' invention relates to engine exhaust gas recirculation (EGR) systems. Spec. ¶ 1. Claim 10, reproduced below, is illustrative of the subject matter on appeal.

10. An engine assembly comprising:
- an engine structure defining a combustion chamber and intake and exhaust ports in communication with the combustion chamber;
 - an intake system in communication with the intake port;
 - an exhaust system including:
 - an exhaust conduit in communication with the exhaust port;
 - a diesel particulate filter located in the exhaust conduit;
 - and
 - a backpressure control valve located in the exhaust conduit downstream of the diesel particulate filter;
 - an exhaust gas recirculation system selectively providing internal exhaust gas recirculation; and
 - a control module in communication with the backpressure control valve and adapted to estimate a flow restriction through the diesel particulate filter, adjust the backpressure control valve position based on the flow restriction and provide a controlled amount of internal exhaust gas recirculation to the engine assembly based on the adjusted backpressure control valve position.

THE REJECTIONS

The Examiner relies upon the following as evidence in support of the rejections:

Khair	US 5,806,308	Sept. 15, 1998
Aoyama	US 2003/0106542 A1	June 12, 2003
Hashizume	US 2008/0196395 A1	Aug. 21, 2008
Foster	US 2010/0005782 A1	Jan. 14, 2010
Itoga	US 2010/0274463 A1	Oct. 28, 2010
Styles	US 7,934,486 B1	May 3, 2011

The following rejections are before us for review:

1. Claims 1, 2, 4, 5, 6, 7, 10, 14, 15, 16, and 17 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Hashizume and Styles.
2. Claim 3 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Hashizume, Styles, and Khair.
3. Claims 8, 9, and 18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Hashizume, Styles, and Foster.
4. Claims 11 and 12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Hashizume, Styles, Itoga, and Aoyama.
5. Claim 13 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Hashizume, Styles, Khair, Itoga, and Aoyama.
6. Claim 19 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Hashizume, Styles, Foster, Itoga, and Aoyama.

OPINION

*Unpatentability of Claims 1, 2, 4, 5, 6, 7, 10, 14, 15, 16, and 17
over Hashizume and Styles*

Claim 10

The Examiner finds that Hashizume discloses the invention except for: (1) an exhaust gas recirculation system selectively providing internal exhaust gas recirculation; and (2) a control module in communication with a backpressure control valve that is adapted to: (a) estimate a flow restriction through a diesel particulate filter, (b) adjust the backpressure control valve position based on the flow restriction; and (c) provide a controlled amount of internal exhaust gas recirculation to the engine assembly based on the adjusted backpressure control valve position. Final Action 8–9. The Examiner relies on Styles as teaching an exhaust gas recirculation system

that is adapted to provide a controlled amount of internal exhaust gas recirculation based on adjusting the backpressure control valve. *Id.* The Examiner concludes that it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Hashizume by Styles to achieve the claimed invention. *Id.* at 9. According to the Examiner, a person of ordinary skill in the art would have done this to increase the internal exhaust gas recirculation rate by increasing the exhaust pressure in the exhaust manifold. *Id.* at 10 (citing Styles, col. 6, ll. 44–48).

Appellants argue that Hashizume relates to regenerating a diesel particulate matter filter. Appeal Br. 17–18. Appellants take the position that Hashizume adjusts a backpressure control valve to regenerate the particulate filter and maintains a pressure within the particulate filter during the regeneration process. *Id.* at 19. Therefore, according to Appellants, “Hashizume does not disclose adjusting the backpressure control valve based on a flow restriction through a particulate filter for providing a controlled amount of internal exhaust gas recirculation, as claimed.” *Id.* (emphasis omitted). Appellants argue that Styles fails to teach adjusting a backpressure control valve based on estimated flow restriction through a particulate filter. *Id.* at 20–21 (“Styles does not provide any discussion of a back pressure control valve at all”).

In response, the Examiner states that Hashizume describes adjusting an exhaust throttle valve based on the amount of particulate matter within the diesel particulate filter, which is determined by detecting differential pressure. Ans. 21 (citing Hashizume ¶¶ 69, 72, 73). The Examiner explains that Styles teaches that increasing backpressure within the exhaust manifold reduces the ability of exhaust gases to escape the combustion chamber. *Id.*

(citing Styles, col. 6, ll. 44–48). Thus, according to the Examiner, Styles teaches that increasing backpressure adjusts internal EGR. *Id.* The Examiner then states that when Hashizume’s backpressure valve adjusts backpressure, the amount of internal exhaust recirculation is “controlled.” *Id.* The Examiner concludes by stating that “[t]his is obviated in view of Styles’s teaching.” *Id.*

“Internal EGR” is a term of art in the field of automotive emissions control and refers to a situation when either: (1) the valve timing is arranged so that there is some back-flow into the combustion chamber from the exhaust; or (2) all exhaust gases are not pushed out of the combustion chamber on the exhaust stroke.² The term “Internal EGR” is consistently used in Styles and in Appellants’ Specification in a manner that is consistent with this meaning. *See* Styles, col. 6, ll. 42–48; Spec. ¶¶ 31–34.

Hashizume is directed to an exhaust gas purification system for an internal combustion engine. Hashizume, Abstract. Hashizume controls the pressure inside of a particulate filter to facilitate regeneration of the filter. *Id.* ¶ 75. An Electronic Control Unit (ECU) controls operation of exhaust throttle 12 in relation to pressure within particulate filter 11. *Id.* ¶¶ 69, 75, 76, and 101.

Styles is directed to a method for controlling combustion in a combustion chamber of turbocharged engine. Styles, Abstract. Styles teaches that partially closing an exhaust back-pressure valve may increase the internal EGR rate. *Id.* col. 6, ll. 42–48.

² Julian Edgar, EGR COMEBACK, WHY AND HOW EXHAUST GAS RECIRCULATION IS AGAIN BIG NEWS, http://www.autospeed.com/cms/A_112612/printArticle.html (last accessed February 20, 2018), first published in 2008.

Thus, Hashizume teaches monitoring pressure in a diesel particulate filter and controlling back-pressure with an ECU controlled backpressure control valve. Styles, in turn, teaches that increasing back-pressure in an exhaust system can influence internal EGR. The question before us is whether a person of ordinary skill in the art, armed with the teachings of Hashizume and Styles, would have found it obvious to achieve the claimed invention.

The obviousness inquiry requires a determination that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so. *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1360 (Fed. Cir. 2012). The presence or absence of a motivation to combine references in an obviousness determination is a question of fact. *See Par Pharm., Inc. v. TWI Pharm., Inc.*, 773 F.3d 1186, 1196 (Fed. Cir. 2014). “The reasonable expectation of success requirement refers to the likelihood of success in combining references to meet the limitations of the claimed invention.” *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir. 2016). In other words, “one must have a motivation to combine accompanied by a reasonable expectation of achieving what is claimed in the patent-at-issue.” *Id.*

In the instant case, we are not persuaded that the Examiner has provided sufficient articulated reasoning with a rational underpinning to explain how and/or why a person of ordinary skill in the art would have been led to the claimed invention by the cited art. Hashizume uses an ECU to control back-pressure to regenerate a diesel particulate filter. While the

back-pressure control valve (12) might have an effect on internal EGR, we are not persuaded by the Examiner's rather abbreviated analysis and remarks that Hashizume's ECU is capable of controlling the regeneration process in the diesel particulate filter and, also, simultaneously "controlling" internal EGR.³ Similarly, we are not persuaded by the Examiner's analysis that a person of ordinary skill in the art would have been motivated to sacrifice the filter regeneration functionality of Hashizume so that back-pressure controlled by the ECU and valve 12 could be devoted, instead, to controlling internal EGR.

The Examiner provides insufficient reasoning and rationale to support the combination of Hashizume and Styles in the manner proposed in the rejection. Consequently, we do not sustain the Examiner's unpatentability rejection of claim 10.

Claim 1

Claim 1 is an independent claim that recites a method substantially in accordance with the apparatus that is recited in claim 10. The Examiner's rejection of claim 1 suffers from the same infirmity that we have identified above with respect to claim 10. For the same reasons articulated above with respect to claim 10, we do not sustain the unpatentability rejection of claim 1.

Claims 2, 4, 5, 6, 7, 14, 15, 16, and 17

These claims depend, directly or indirectly, from either claim 1 or 10. Claims App. The Examiner's rejection of these claims suffers from the

³ We do not opine on whether this may, in fact, be possible. For purposes of this decision, we simply determine that the Examiner has provided insufficient technical reasoning and analysis to support the conclusion of obviousness reached in the rejection.

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same infirmity that was identified above with respect to claims 1 and 10. Thus, for essentially the same reason expressed above in connection with claims 1 and 10, we do not sustain the rejection of claims 2, 4, 5, 6, 7, 14, 15, 16, and 17.

Unpatentability of Claims 3, 8, 9, 11, 12, 13, 18, and 19

These claims depend, directly or indirectly, from claims 1 or 10 and are rejected over Hashizume and Styles in combination with various other references. Claims App.; Final Action 4–21. The Examiner makes no findings of fact or conclusions of law with respect to these additional references that cure the deficiencies that we have noted with respect to claims 1 and 10 above. Consequently, we do not sustain the unpatentability rejection of claims 3, 8, 9, 11, 12, 13, 18, and 19.

DECISION

The decision of the Examiner to reject claims 1–19 is REVERSED.

REVERSED