

The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* KAI CHEN, SCOTT R. PETERSON, and NING LEI

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Appeal 2007-0571  
Application 10/277,004  
Technology Center 3700

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Decided: June 8, 2007

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Before HUBERT C. LORIN, STUART S. LEVY, and LINDA E. HORNER,  
*Administrative Patent Judges.*

HORNER, *Administrative Patent Judge.*

DECISION ON APPEAL

## STATEMENT OF THE CASE

Appellants seek our review under 35 U.S.C. § 134 (2002) of the Examiner's final rejection of claims 1, 4-7, and 10-20.<sup>1</sup> We have jurisdiction under 35 U.S.C. § 6(b) (2002).

## SUMMARY OF DECISION

We AFFIRM-IN-PART.

## THE INVENTION

Appellants' claimed invention is to a system and method for providing improved exhaust gas recirculation (EGR) mass flow rate to the intake manifold of an internal combustion engine (Specification 2:[0005]). Claims 1 and 16, reproduced below, are representative of the subject matter on appeal.

1. An apparatus comprising:
  - a first divided exhaust manifold in fluid flow communication with a first exhaust gas recirculation (EGR) path;
  - a second divided exhaust manifold in fluid flow communication with a second EGR path;
  - a first check valve, arranged and constructed to prevent backflow from an intake manifold and backflow from the second divided exhaust manifold from entering the first divided exhaust manifold;
  - a second check valve, arranged and constructed to

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<sup>1</sup> Claims 2 and 3 have been canceled and claims 8 and 9 are objected to as being dependent upon a rejected base claim.

prevent backflow from the intake manifold and backflow from the first divided exhaust manifold from entering the second divided exhaust manifold.

16. A method comprising the steps of:
- receiving, at boost pressure, a flow comprising air and exhaust gas at a plurality of cylinders into a first divided exhaust manifold;
  - expelling exhaust gas from a second subset of the plurality of cylinders into a second divided exhaust manifold, wherein the first subset and the second subset are different;
  - receiving, by an exhaust gas recirculation (EGR) system at an EGR inlet, a part of the exhaust gas from the first divided exhaust manifold and a part of the exhaust gas from the second divided exhaust manifold;
  - when the boost pressure is higher than exhaust pressure at one or more of the first divided exhaust manifold and the second divided exhaust manifold, inhibiting all backflow from entering the first divided exhaust manifold and the second divided exhaust manifold.

#### THE REJECTIONS

The Examiner relies upon the following as evidence of unpatentability:

Faletti	US 6,408,833 B1	Jun. 25, 2002
Bailey	US 6,598,396 B2	Jul. 29, 2003
Sumser	US 6,694,735 B2	Feb. 24, 2004

The following rejections are before us for review.

1. Claims 1, 4-7, and 16-19 stand rejected under 35 U.S.C. § 102(e) as anticipated by Bailey.
2. Claims 10-13 and 15 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Bailey and Sumser.<sup>2</sup>
3. Claims 14 and 20 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Bailey, Sumser, and Faletti.<sup>3</sup>

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<sup>2</sup> The Final Office Action, dated November 1, 2005, cites to German Patent Document DE 10152803 (Sumser et al.) in the rejections of claims 10-13, 15, and 20 (Final Office Action 5). The Examiner appears to substitute the U.S. counterpart patent in the evidence relied upon section of the Answer (Answer 3).

<sup>3</sup> The Answer states that claims 14 and 20 are rejected based on the same grounds, i.e., as unpatentable over Bailey, Sumser, and Faletti (Answer 2). The Answer subsequently, however, lists the rejection of claim 20 as based on only the combination of Bailey and Faletti (Answer 5). Since claim 20 depends from claim 11, which was rejected based on the combination of Bailey and Sumser, we understand the Examiner's rejection of claim 20 to be based on the combined teachings of Bailey, Sumser, and Faletti.

## ISSUES

Appellants contend that Bailey fails to teach check valves that prevent backflow, as set forth in claim 1 (Appeal Br. 10). Appellants further contend Bailey fails to teach inhibiting all backflow when the boost pressure is higher than exhaust pressure, as set forth in claim 16 (Appeal Br. 11). Appellants further contend that neither Bailey nor Sumser teaches or suggests check valves to prevent backflow, as set forth in claim 11 (Appeal Br. 15). Appellants further contend that Faletti fails to show a Y-pipe, as recited in claim 14 (Reply Br. 6) and Faletti fails to cure the deficiencies of the combination of Bailey and Sumser (Appeal Br. 15; Reply Br. 6).

The Examiner determined that Appellants' invention is simply mounting two check valves on EGR conduits and Bailey clearly meets that concept (Answer 7). The Examiner found that Appellants' check valves can only prevent the backflow in the EGR path, not in other paths or in the main conduit, which is exactly the same as the check valves in Bailey (Answer 7).

The issues before us are whether Appellants have shown that Bailey fails to teach check valves to prevent backflow as recited in independent claims 1 and 16, Appellants have shown that the Examiner erred in finding the combination of Bailey and Sumser renders obvious the subject matter of claims 10-13 and 15, and Appellants have shown that the Examiner erred in finding the combination of Bailey, Sumser, and Faletti renders obvious the subject matter of claims 14 and 20.

## FINDINGS OF FACT

The relevant facts include the following:

The goal of the invention is to provide improved EGR mass flow rate to the intake manifold of an internal combustion engine (Specification 2:[0005]).

Appellants attain this goal by preventing backflow from the intake pipe or intake manifold from entering either of the divided exhaust manifolds, thereby increasing the use of the exhaust pulse energy (Specification 7:[0027]). Appellants further attain this goal by preventing flow from one exhaust manifold entering the other exhaust manifold when the pressure at one manifold is significantly lower than the pressure at the other manifold, thereby further increasing the use of the exhaust energy pulse (Specification 7:[0026]).

Bailey recognizes when utilizing EGR in a turbocharged engine, the reintroduction of exhaust gases to the intake manifold will occur naturally when the exhaust manifold pressure is higher than the turbocharged boost pressure. However, when the turbocharged engine operates under low speed and high torque conditions, the boost pressure is typically higher than the exhaust manifold pressure and recirculation of the exhaust gases is not possible (Bailey, col. 1, ll. 54-60). Bailey solves this problem by adding a one-way check valve in the conduit between each exhaust manifold and the EGR system, as described below.

Bailey discloses an internal combustion engine 10 having an engine block 11, a first exhaust manifold 14, a second exhaust manifold 16, a turbocharger 18, an intake manifold 24, and an EGR system 26 (Bailey, col. 4, ll. 1-6). Bailey discloses that the EGR system 26 includes a first check valve 64

having an EGR inlet 76 and an EGR outlet 78, and a second check valve 66 having an EGR inlet 80 and an EGR outlet 82. The EGR inlet 76 is coupled to the EGR exhaust outlet 36 by a fluid conduit 84, and the EGR inlet 80 is coupled to the EGR exhaust outlet 38 by a fluid conduit 86. A Y-conduit 88 is respectively connected at its Y-end to the EGR outlets 78, 82, and is connected at its single end to an inlet port 90 of the regenerator directional flow control valve 68 (Bailey, col. 5, ll. 12-20; Figure).

Bailey teaches that during operation, check valves 64, 66 permit fluid flow only from their respective inputs 76, 80 to their respective outputs 78, 82, and prohibit back flow of gases into the exhaust manifolds 14, 16 when the pressure at the EGR outlets 78, 82 exceeds the pressure at the EGR inlets 76, 80, respectively (Bailey, col. 6, ll. 57-62). As such, when the directional flow control valve 68 is open to flow port 108 of the EGR system, check valve 64 prevents backflow from conduit 60 (the intake pipe leading to intake manifold 24) to first exhaust manifold 14. Check valve 64 also prevents backflow of exhaust gases from second exhaust manifold 64 from entering first exhaust manifold 14. Similarly, when the directional flow control valve 68 is open to flow port 108 of the EGR system, check valve 66 prevents backflow from conduit 60 to second exhaust manifold 16. Check valve 66 also prevents backflow of exhaust gases from first exhaust manifold 14 from entering second exhaust manifold 16.

Bailey further discloses redirecting bleed air from conduit 60, via a bleed air conduit 130, through the second particulate trap/stationary recuperator 58 in a reverse flow direction. The bleed air is then discharged from the recuperator 58

through a fluid conduit 114 to the flow control valve 68, which directs the air into a Y-conduit 124 in communication with first and second exhaust manifolds 14, 16 (Bailey, col. 5, ll. 38 - col. 6, l. 3). As such, in the system of Bailey, backflow from one exhaust manifold can enter another exhaust manifold because there are no check valves in the Y-conduit 124. Further, when the directional flow control valve 68 is open to discharge port 92, a portion of the flow from the conduit 60 is bled from the conduit 60 and fed back to exhaust manifolds 14 and 16. Thus, Bailey does not disclose a method of inhibiting all backflow from entering the first divided exhaust manifold and the second divided exhaust manifold when the boost pressure is higher than exhaust pressure at one or more of the exhaust manifolds. Rather, Bailey purposely directs some backflow to the exhaust manifolds.

Sumser discloses an internal combustion engine 1 including an exhaust turbocharger 2 and an exhaust-gas recirculation device 9 (Sumser, Abstract). Sumser discloses that the internal combustion engine 1 has banks of cylinders 1a, 1b and exhaust gases from the cylinders of each bank are discharged into two independent exhaust lines 4a and 4b and fed to the exhaust turbine 3 of the turbocharger 2 (Sumser, col. 3, l. 66 – col. 4, l. 3, Figure 1).

Faletti discloses an exhaust gas recirculation system 50 having fluid lines 52 and 54 from exhaust manifolds 18 and 20, respectively. Faletti teaches that flows from fluid lines 52 and 54 are combined in a single EGR fluid line 60 having an EGR cooler 62 therein (Faletti, col. 3, ll. 54-61 and Figure). As such, Faletti teaches that it was well known at the time of the invention to put an EGR cooler in a combined EGR path from two separate EGR paths.

## PRINCIPLES OF LAW

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987), *cert. denied*, 484 U.S. 827 (1987).

In rejecting claims under 35 U.S.C. § 103(a), the examiner bears the initial burden of establishing a prima facie case of obviousness. *In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). *See also In re Piasecki*, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984). It is incumbent upon the examiner to establish a factual basis to support the legal conclusion of obviousness. *See In re Fine*, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the examiner is expected to make the factual determinations set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966), *viz.*, (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; and (3) the level of ordinary skill in the art. In addition to these factual determinations, the examiner must also provide “some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006) (*cited with approval in KSR Int’l. Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1741, 82 USPQ2d 1385, 1396 (2007)). Only if this initial burden is met does the burden of coming forward with evidence or argument shift to the appellant. *See Oetiker*, 977 F.2d at 1445, 24 USPQ2d at 1444. *Id.* at 1445, 24 USPQ2d at 1444. *See also Piasecki*,

Appeal 2007-0571  
Application 10/277,004

745 F.2d at 1472, 223 USPQ at 788. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. *See Oetiker*, 977 F.2d at 1445, 24 USPQ2d at 1444; *Piasecki*, 745 F.2d at 1472, 223 USPQ at 788.

### ANALYSIS

The Examiner rejected claims 1, 4-7, and 16-19 under 35 U.S.C. § 102(e) as anticipated by Bailey. Appellants argue that Bailey fails to teach a check valve that prevents backflow from an intake manifold from entering a divided exhaust manifold, as recited in claim 1, because Bailey's regenerator cleaning process requires backflow from the air intake into the exhaust manifolds. (Appeal Br. 10). As we found *supra*, Bailey discloses check valves 64 and 66 that prevent backflow as claimed. While we agree that Bailey's system allows backflow to travel from the air intake into the exhaust manifold in the regenerator cleaning process, that flow does not negate the function of the check valves in Bailey, which are located between one of the divided exhaust manifolds and the EGR system for preventing backflow from the air intake to the exhaust manifold. Claim 1 does not require that the check valves prevent all backflow to the exhaust manifold. Rather, claim 1 more broadly requires only that the check valves operate to prevent backflow from an intake manifold from entering a divided exhaust manifold. Bailey's check valves clearly perform this function, and thus meet the limitations of claim 1, as recited.

Appeal 2007-0571  
Application 10/277,004

Appellants further argue that Bailey's system allows backflow to travel between its divided exhaust manifolds, and thus Bailey's check valves are not positioned to prevent backflow from one divided exhaust manifold from entering the other, as set forth in claim 1 (Appeal Br. 10). For the same reasons provided above, we do not see where the language of claim 1 requires that the check valves prevent all backflow from one divided exhaust manifold to the other. Rather, claim 1 requires only check valves arranged and constructed to prevent backflow from one divided exhaust manifold to another. Bailey's check valves are positioned so that exhaust from one exhaust manifold can travel only one way from the exhaust manifold to the EGR system and cannot travel as backflow to the other exhaust manifold via the Y-pipe. As such, Bailey's system meets the limitations of claim 1. Appellants do not provide arguments for separately patentability of dependent claims 4-7, thus these claims fall with claim 1. 37 C.F.R. § 41.37(c)(1)(vii) (2006).

Appellants further argue that Bailey fails to teach or suggest that when the boost pressure is higher than exhaust pressure at one or more of the first divided exhaust manifold and the second divided exhaust manifold, inhibiting all backflow from entering the first divided exhaust manifold and the second divided exhaust manifold, as recited in claim 16 (Appeal Br. 11). Claim 16, unlike claim 1, requires that the system inhibit "all backflow" from entering the exhaust manifolds. As we found *supra*, Bailey's system is designed specifically to allow backflow to the exhaust manifolds, and as such, does not anticipate the subject matter of claim 16, and its dependent claims 17-19.

Appeal 2007-0571  
Application 10/277,004

The Examiner rejected claims 10-13 and 15 under 35 U.S.C. § 103(a) as unpatentable over Bailey and Sumser. With respect to claim 10, which depends from claim 1, Appellants argue that Sumser fails to cure the deficiency of Bailey (Appeal Br. 14). Finding no deficiency in Bailey, Appellants have failed to show that the Examiner erred in rejected claim 10 based on the combined teachings of Bailey and Sumser.

Appellants further argue that neither Bailey nor Sumser teach or suggest a first check valve to prevent backflow from entering the first divided exhaust manifold and a second check valve to prevent backflow from entering a second divided exhaust manifold, as set forth in claim 11 (Appeal Br. 15). As explained above with respect to claim 1, Bailey discloses check valves 64 and 66 that prevent backflow from one exhaust manifold from entering another exhaust manifold. The fact that backflow from other areas of the system can enter the exhaust manifolds does not negate the function of the check valves in Bailey. Similar to claim 1, claim 11 does not require that the check valves prevent all backflow to the exhaust manifolds. As such, Appellants have failed to show how the Examiner erred in finding that the subject matter of claim 11 would have been obvious to one having ordinary skill in the art based on the combined teachings of Bailey and Sumser.

Further, Bailey's check valves 64 and 66 prevent backflow from the intake manifold and from a first or second exhaust manifold from entering the other exhaust manifold. As such, the subject matter of claims 12 and 13 would have been obvious to one having ordinary skill in the art based on the combined teachings of Bailey and Sumser. Appellants do not provide arguments for

Appeal 2007-0571  
Application 10/277,004

separately patentability of dependent claims 15, thus this claim falls with claim 11. 37 C.F.R. § 41.37(c)(1)(vii) (2006).

Appellants argue generally that one of skill in the art would not have been motivated to combine Bailey and Sumser (Appeal Br. 15). Appellants fail, however, to provide any arguments or evidence to support this contention. Since we have determined that the Examiner set forth a prima facie case of obviousness, the burden is on Appellants to provide some evidence or arguments as to why the claimed invention would not have been obvious to one having ordinary skill in the art at the time of the invention. Appellants have failed to provide anything more than a bald assertion of lack of motivation to combine. We do not find this persuasive.

Claims 14 and 20 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Bailey, Sumser, and Faletti. The Examiner (Answer 5) relies on Faletti to show that it was known in the art to place EGR coolers in a combined EGR path from two separate EGR paths. Appellants contend Faletti fails to show a Y-pipe, as recited in claim 14 (Reply Br. 6). Even if we were to accept Appellants' characterization of Faletti as disclosing a T-junction, instead of a Y-pipe, it is clear from the art, e.g., Bailey, that Y-pipes were commonly used at the time of the invention in the internal combustion engine art (Bailey, col. 4, ll. 37-40 and col. 5, ll. 18-21), and Appellants fail to show why it would not have been obvious to use a Y-pipe in lieu of Faletti's T-junction. Appellants further contend that Faletti fails to cure the deficiencies of the combination of Bailey and Sumser (Appeal Br. 15; Reply Br. 6). Since we see no deficiencies in the combined teachings of Bailey

Appeal 2007-0571  
Application 10/277,004

and Sumser as it relates to independent claim 11 (from which claims 14 and 20 depend), this argument by Appellants fails. Appellants again make an unsupported assertion that one of skill in the art would not have been motivated to combine Bailey, Sumser, and Faletti (Reply Br. 6). For the same reasons provided *supra*, we find this bald assertion of lack of motivation to combine unpersuasive.

#### CONCLUSIONS OF LAW

We conclude that Appellants have failed to show that the Examiner erred in the rejection under 35 U.S.C. § 102(e) of claims 1 and 4-7 as anticipated by Bailey, and in the rejections under 35 U.S.C. § 103(a) of claims 10-13 and 15 as unpatentable over Bailey and Sumser and of claims 14 and 20 as unpatentable over Bailey, Sumser, and Faletti.

We conclude that the Examiner erred in the rejection of claims 16-19 under 35 U.S.C. § 102(e) as anticipated by Bailey.

#### DECISION

The Examiner's rejections of claims 1 and 4-7 under 35 U.S.C. § 102(e) as anticipated by Bailey, of claims 10-13 and 15 under 35 U.S.C. § 103(a) as unpatentable over Bailey and Sumser, and of claims 14 and 20 under 35 U.S.C. § 103(a) as unpatentable over Bailey, Sumser, and Faletti are sustained.

The Examiner's rejection of claims 16-19 under 35 U.S.C. § 102(e) as anticipated by Bailey is not sustained.

Appeal 2007-0571  
Application 10/277,004

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv) (2006).

AFFIRMED-IN-PART

jrg

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