

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To: MORENO, Christopher, P. Moreno Intellectual Property Law LLC 1901 Notrth Roselle Road Suite 800 Schaumburg, IL 60195 USA		Date of mailing (day/month/year) 28 November 2018 (28.11.2018)	
Applicant's or agent's file reference JVSPP075WO		FOR FURTHER ACTION See paragraph 2 below	
International application No. PCT/US2018/045264	International filing date (day/month/year) 03 August 2018 (03.08.2018)	Priority date(day/month/year) 03 August 2017 (03.08.2017)	
International Patent Classification (IPC) or both national classification and IPC F01L 13/00(2006.01)i, F02D 13/04(2006.01)i, F02M 26/52(2016.01)i, F02D 9/08(2006.01)i, F02B 37/12(2006.01)i			
Applicant JACOBS VEHICLE SYSTEMS, INC.			

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR International Application Division Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea Facsimile No. +82-42-481-8578	Date of completion of this opinion 28 November 2018 (28.11.2018)	Authorized officer LEE, Dal Kyong Telephone No. +82-42-481-8440
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WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US2018/045264

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :
 - the international application in the language in which it was filed
 - a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
2. This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
 - a. forming part of the international application as filed:
 - in the form of an Annex C/ST.25 text file.
 - on paper or in the form of an image file.
 - b. furnished together with the international application under PCT Rule 13ter.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
 - c. furnished subsequent to the international filing date for the purposes of international search only:
 - in the form of an Annex C/ST.25 text file (Rule 13ter.1(a)).
 - on paper or in the form of an image file (Rule 13ter.1(b) and Administrative Instructions, Section 713).
4. In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

**WRITTEN OPINION OF THE
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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1-10</u>	YES
	Claims	<u>NONE</u>	NO
Inventive step (IS)	Claims	<u>NONE</u>	YES
	Claims	<u>1-10</u>	NO
Industrial applicability (IA)	Claims	<u>1-10</u>	YES
	Claims	<u>NONE</u>	NO

2. Citations and explanations :

Reference is made to the following documents:

- D1: US 5437156 A (CUSTER, DENNIS R.) 01 August 1995
- D2: US 2002-0023619 A1 (JANAK et al.) 28 February 2002
- D3: US 5410882 A (DAVIES et al.) 02 May 1995
- D4: US 2008-0216795 A1 (DIETZ et al.) 11 September 2008
- D5: US 2014-0034010 A1 (TULA TECHNOLOGY, INC.) 06 February 2014

1. Novelty and Inventive Step

1.1 Independent Claim 1

D1, which is considered to be the closest prior art to the subject matter of claim 1, discloses a method for selectively lowering an intake manifold pressure of a turbocharged engine (10) during operation of associated compression release engine brake, the internal engine (10) comprising at least one cylinder, intake valves, and exhaust valves, the method comprising the step of causing the exhaust valves in the at least one cylinder of the engine (10) to open for engine braking when those valves would not otherwise open during normal power mode operation of the engine (10) (see column 1, lines 25-35, column 4, lines 29-37 and figure 1). Claim 1 differs from D1 in that a method for controlling counter flow and pressure in an intake flow path of an internal combustion engine during an engine braking operation comprises the step of managing counter flow in an intake flow path with at least one airflow management device disposed in at least one of the intake flow path or an exhaust flow path. However, this feature would be easily conceived from the step of selectively releasing gas from the intake manifold of the internal combustion engine (10) equipped with a compression release engine brake (20) by using a valve of a pressure relief system (100) in D1 (see column 6,

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lines 15-24 and figure 1). Accordingly, claim 1 would have been obvious over D1. Therefore, claim 1 lacks an inventive step under PCT Article 33(3).

1.2 Dependent Claims 2-9

1.2.1 Concerning Claim 2

The additional feature of claim 2, characterized in that the airflow management device includes an exhaust gas recirculation valve in communication with the intake flow path and the exhaust flow path, the exhaust gas recirculation valve providing a first level of communication between the intake flow path and the exhaust flow path during steady-state engine braking operation, and the step of managing counterflow in the intake flow path further comprises no later than deactivation of a main event motion of at least one exhaust valve, controlling the exhaust gas recirculation valve to increase communication between the intake flow path and the exhaust flow path above the first level of communication, is not disclosed in D1. However, this feature would be easily conceived from D2 considering that an exhaust gas recirculation valve (160) is opened briefly during a braking event and exhaust gas is released into an exhaust gas recirculation passage (150), wherein the exhaust passage (150) provides a path from an exhaust manifold to an intake manifold (see paragraph [0051] and figure 1). As D1 and D2 are directed toward a similar subject matter, a person skilled in the art would, in seeking a solution to the problem being addressed, be motivated to combine the disclosures of each of documents to arrive at the claimed invention. Accordingly, claim 2 would have been obvious over D1 in view of D2. Therefore, claim 2 lacks an inventive step under PCT Article 33(3).

1.2.2 Concerning Claim 3

The additional feature of claim 3 is characterized in that the airflow management device comprises an intake throttle valve disposed in the intake flow path, the intake throttle providing a first level of flow in the intake flow path during steady state engine braking operation, and the step of managing counterflow in the intake flow path further comprises no later than deactivation of a main event motion of at least one exhaust valve, controlling the intake throttle valve to restrict flow in the intake flow path below the first level of flow. This feature would be easily conceived from the step of selectively releasing gas from the intake manifold by using the valve of the pressure relief system (100) in D1 (see column 6, lines 15-24 and

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figure 1). Accordingly, claim 3 would have been obvious over D1. Therefore, claim 3 lacks an inventive step under PCT Article 33(3).

1.2.3 Concerning Claim 4

The additional feature of claim 4, characterized in that the airflow management device comprises a turbocharger in communication with the intake flow path and the exhaust flow path, a turbine of the turbocharger configured to provide a first level of boost pressure in the intake flow path during steady state engine braking operation, and the step of managing counterflow in the intake flow path further comprises no later than deactivation of a main event motion of at least one exhaust valve, controlling the turbine to decrease boost pressure in the intake flow path below the first level of boost pressure, is not disclosed in D1. However, this feature would be easily conceived from D3 considering that a backpressure is produced on a turbine (30a) to reduce the speed of the turbine (30a) during engine braking (see column 5, lines 10-33 and figure 1). As D1 and D3 are directed toward a similar subject matter, a person skilled in the art would, in seeking a solution to the problem being addressed, be motivated to combine the disclosures of each of documents to arrive at the claimed invention. Accordingly, claim 4 would have been obvious over D1 in view of D3. Therefore, claim 4 lacks an inventive step under PCT Article 33(3).

1.2.4 Concerning Claim 5

The additional feature of claim 5, characterized in that the airflow management device comprises a turbocharger in communication with the intake flow path and the exhaust flow path and a wastegate in communication with the exhaust flow path, the wastegate and the turbocharger configured to provide a first level of boost pressure in the intake flow path during steady state engine braking operation, and the step of managing counterflow in the intake flow path further comprises no later than deactivation of a main event motion of at least one exhaust valve, controlling the wastegate to decrease boost pressure provided by the turbocharger in the intake flow path below the first level of boost pressure, is not disclosed in D1. However, this feature would be easily conceived from D3 considering that a diverter (44) can be opened by a diverter actuator (62) to allow some of engine exhaust gas to bypass a turbine (30a) when it is desired to slow down a turbocharger (30) (see column 6, lines 22-29 and figure 11). As D1 and D3 are directed toward a similar subject matter, a person skilled in the

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art would, in seeking a solution to the problem being addressed, be motivated to combine the disclosures of each of documents to arrive at the claimed invention. Accordingly, claim 5 would have been obvious over D1 in view of D3. Therefore, claim 5 lacks an inventive step under PCT Article 33(3).

1.2.5 Concerning Claim 6

The additional feature of claim 6, characterized in that the airflow management device comprises a turbocharger in communication with the intake flow path and the exhaust flow path and an exhaust throttle valve in the exhaust flow path, the exhaust throttle valve and the turbocharger configured to provide a first level of boost pressure in the intake flow path during steady state engine braking operation, and the step of managing counterflow in the intake flow path further comprises no later than deactivation of a main event motion of at least one exhaust valve, controlling the exhaust throttle valve to decrease boost pressure provided by the turbocharger in the intake flow path below the first level of boost pressure, is not disclosed in D1. However, this feature would be easily conceived from D3 considering that a flow restrictor (40) is closed to produce a backpressure on a turbine (30a) to reduce the speed of the turbine (30a) during engine braking (see column 5, lines 10-33 and figure 1). As D1 and D3 are directed toward a similar subject matter, a person skilled in the art would, in seeking a solution to the problem being addressed, be motivated to combine the disclosures of each of documents to arrive at the claimed invention. Accordingly, claim 6 would have been obvious over D1 in view of D3. Therefore, claim 6 lacks an inventive step under PCT Article 33(3).

1.2.6 Concerning Claim 7

The additional feature of claim 7, characterized in that the airflow management device comprises a turbocharger in communication with the intake flow path and the exhaust flow path and a compressor bypass valve in communication with the intake flow path, the compressor bypass valve and the turbocharger configured to provide a first level of boost pressure in the intake flow path during steady state engine braking operation, and the step of managing counterflow in the intake flow path further comprises no later than deactivation of a main event motion of at least one exhaust valve, controlling the compressor bypass valve to decrease boost pressure provided by the turbocharger in the intake flow path below the first level of boost pressure, is not disclosed in D1. However, this feature would be easily

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conceived from D4 considering that air mass flows through a bypass (12) which bypasses a compressor (4) in order to set requested engine braking power (see paragraph [0019] and figure). As D1 and D4 are directed toward a similar subject matter, a person skilled in the art would, in seeking a solution to the problem being addressed, be motivated to combine the disclosures of each of documents to arrive at the claimed invention. Accordingly, claim 7 would have been obvious over D1 in view of D4. Therefore, claim 7 lacks an inventive step under PCT Article 33(3).

1.2.7 Concerning Claim 8

The additional feature of claim 8 is characterized in that the airflow management device comprises a passive blow-off valve in communication with the intake flow path, and the step of managing counterflow in the intake flow path further comprises configuring the passive blow-off valve to open when pressure within in the intake flow path exceeds a predetermined threshold. This feature would be easily conceived from the step of selectively releasing gas from the intake manifold of the internal combustion engine (10) by using the valve of the pressure relief system (100) in D1 (see column 6, lines 15-24 and figure 1). Accordingly, claim 8 would have been obvious over D1. Therefore, claim 8 lacks an inventive step under PCT Article 33(3).

1.2.8 Concerning Claim 9

The additional feature of claim 9 is characterized in that the airflow management device comprises an active blow-off valve in communication with the intake flow path, and the step of managing counterflow in the intake flow path further comprises no later than deactivation of the main event motion of the at least one exhaust valve, controlling the active blow-off valve to open. This feature would be easily conceived from the step of selectively releasing gas from the intake manifold of the internal combustion engine (10) by using the valve of the pressure relief system (100) in D1 (see column 6, lines 15-24 and figure 1). Accordingly, claim 9 would have been obvious over D1. Therefore, claim 9 lacks an inventive step under PCT Article 33(3).

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1.3 Independent Claim 10

D1, which is considered to be the closest prior art to the subject matter of claim 10, discloses a method for selectively lowering an intake manifold pressure of a turbocharged engine (10) during operation of associated compression release engine brake, the internal engine (10) comprising at least one cylinder, intake valves, and exhaust valves, the method comprising the step of: causing the exhaust valves in the at least one cylinder of the engine (10) to open for engine braking when those valves would not otherwise open during normal power mode operation of the engine (10) (see column 1, lines 25-35, column 4, lines 29-37 and figure 1). Claim 10 differs from D1 in that a method for controlling counter flow and pressure in an intake flow path of an internal combustion engine during an engine braking operation comprises the step of after expiry of a period of time following initiating engine braking operation for a first group of cylinders, initiating engine braking operation for a second group of cylinders from a plurality of cylinders, the second group of cylinders including at least one cylinder not included in the first group of cylinders, wherein initiating engine braking operation comprises the steps of: for each cylinder in the second group of cylinders, deactivating main event motion of the at least one exhaust valve; and for each cylinder in the second group of cylinders, activating a braking motion of at least one exhaust valve. However, this feature would be easily conceived from the step of causing the exhaust valves in the at least one cylinder of the engine (10) to open for engine braking when those valves would not otherwise open during normal power mode operation of the engine (10) in D1 (see column 1, lines 25-35, column 4, lines 29-37 and figure 1) and an engine (150) in a skip cylinder engine braking mode, wherein in the skip cylinder engine braking mode, selected working cycles of at least one selected working chamber are deactivated and other selected working cycles of at least one selected working chamber are operated in a braking mode such that at least one working chamber is sometimes deactivated and sometimes operated in the braking mode in D5 (see paragraph [0009] an figure 1). As D1 and D5 are directed toward a similar subject matter, a person skilled in the art would, in seeking a solution to the problem being addressed, be motivated to combine the disclosures of each of documents to arrive at the claimed invention. Accordingly, claim 10 would have been obvious over D1 in view of D5. Therefore, claim 10 lacks an inventive step under PCT Article 33(3).

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2. Industrial Applicability

Claims 1-10 are industrially applicable under PCT Article 33(4).