

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

# PCT

## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

To:

see form PCT/ISA/220

Date of mailing  
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference  
see form PCT/ISA/220

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.  
PCT/EP2020/025198

International filing date (day/month/year)  
29.04.2020

Priority date (day/month/year)  
29.04.2019

International Patent Classification (IPC) or both national classification and IPC  
INV. F01L1/18 F01L13/06 F01L13/00 F01L1/24 F01L1/46 F01L9/02 F01L1/053

Applicant  
EATON INTELLIGENT POWER LIMITED

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 usually 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:



European Patent Office  
P.B. 5818 Patentlaan 2  
NL-2280 HV Rijswijk - Pays Bas  
Tel. +31 70 340 - 2040  
Fax: +31 70 340 - 3016

Date of completion of  
this opinion

see form  
PCT/ISA/210

Authorized Officer

Aubry, Yann

Telephone No. +31 70 340-0



---

**Box No. I Basis of the 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:

---

**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)                   | Yes: Claims | <u>15, 20</u>      |
|                               | No: Claims  | <u>1-14, 16-19</u> |
| Inventive step (IS)           | Yes: Claims |                    |
|                               | No: Claims  | <u>1-20</u>        |
| Industrial applicability (IA) | Yes: Claims | <u>1-20</u>        |
|                               | No: Claims  |                    |

2. Citations and explanations

**see separate sheet**

---

**Box No. VII Certain defects in the international application**

---

The following defects in the form or contents of the international application have been noted:

**see separate sheet**

---

**Box No. VIII Certain observations on the international application**

---

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

**Re Item V**

1 Reference is made to the following documents:

- D1 DE 10 2004 048072 A1 (INA SCHAEFFLER KG [DE]) 13 April 2006  
(2006-04-13)
- D2 JP S60 252113 A (HINO MOTORS LTD) 12 December 1985 (1985-12-12)
- D3 EP 0 593 908 A1 (STEYR NUTZFAHRZEUGE [AT]) 27 April 1994  
(1994-04-27)
- D4 US 2004/250802 A1 (YANG ZHOU [US] ET AL) 16 December 2004  
(2004-12-16)
- D5 WO 2018/223803 A1 (UNIV DALIAN TECH [CN]) 13 December 2018  
(2018-12-13)
- D6 WO 2018/213237 A1 (CUMMINS INC [US]) 22 November 2018  
(2018-11-22)
- D7 US 2018/023424 A1 (MCCARTHY JR JAMES E [US] ET AL) 25 January  
2018 (2018-01-25)

2 The below-mentioned lack of clarity notwithstanding, the subject-matter of claims 1-14, 16-19 is not new in the sense of Article 33(2) PCT, and the criteria of Article 33(1) PCT are therefore not met:

- 2.1 D1 (see fig. 7) discloses a hydraulic system for a rocker arm (*of the end pivot type*) assembly having an exhaust (see paragraph [0020]) rocker arm configured to selectively open an engine valve (36), the system comprising:
- a carrier assembly configured to couple to a cylinder head of an engine: *the part in which the slave and master pistons reciprocate is a different part than the cylinder head (which guides the valve 36). The mounting of the valve spring, of the valve retainer and of the valve cotters implies that*

*the valve shaft is freely accessible from above. As a consequence, the part in which the slave and master pistons reciprocate is coupled directly or indirectly to the cylinder head of the engine,*

- a brake plunger (1b) assembly disposed in the carrier assembly and configured to be actuated by a braking lobe of a camshaft: *cam (4) causes the exhaust valve to follow its normal exhaust lift but also to causes the exhaust valve to follow a braking lift, see fig. 8. As a consequence, the transition between the recess (18) and the base cam profile can be seen as a braking cam lobe; and*

- a slave plunger (*piston below piston (1b) on fig. 7*) assembly disposed in the carrier assembly and configured to be selectively hydraulically coupled to the brake plunger assembly (1b),

- wherein when the brake plunger assembly and the slave plunger assembly are hydraulically coupled, the brake plunger assembly is configured to impart movement via hydraulic fluid and the slave plunger assembly to actuate the exhaust rocker arm and open the engine valve to perform an engine braking operation: *see paragraphs [0032], [0033], fig. 2, 3 and 8.*

The subject-matter of independent claim 1 and 16 is therefore not new.

The subject-matter of independent claim 7 is therefore not new, see clarity objection.

D2 (fig. 1-3) also discloses also the subject-matter of independent claims 1, 7 and 16: claims 1, 7 and 16 does not require that the rocker arm is the center pivot type. (11) is the carrier.

D3 (fig. 1) also discloses also the subject-matter of independent claims 1, 7 and 16: carrier (44) is another part than the cylinder head (3).

D4 (fig. 10, 11) also discloses also the subject-matter of independent claims 1, 7 and 16: carrier (300) is another part than the cylinder head (200).

2.2 D1 discloses the subject-matter of dependent claims:

- 2, 8: see valve (22),
- 3-6, 9-12, 17-19: features disclosed by D1,
- 13: explicit of fig. 7 of D1,
- 14: the transition between the recess (18) and the base cam profile can be seen as a braking cam lobe,

D2 also discloses the subject-matter of dependent claims: 2-6, 8-12, 14 (*the claim does not require that the two lobes are on a same cam*), 17-19.

D3 also discloses the subject-matter of dependent claims: 2-6 (*spring (28) urges brake and slave piston the way it is claimed*), 8-12, 14 (*the claim does not require that the two lobes are on a same cam*), 17-19.

D4 also discloses the subject-matter of dependent claims: 2, 3, 5, 6, 8, 9, 11, 12, 14, 17-19.

The subject-matter of claims : 2-6, 8-12-14, 17-19 is therefore not new.

3 Furthermore, the below-mentioned lack of clarity notwithstanding, the subject-matter of claims 15 and 20 does not involve an inventive step in the sense of Article 33(3) PCT, and the criteria of Article 33(1) PCT are therefore not met:

3.1 Starting from D5 (see fig. 1), the person skilled in the art would replace the brake switch (703) by an hydraulic system that can transfer the movement from the exhaust brake cam (201) to the exhaust valve (612), via a a hydraulic brake piston and a hydraulic slave piston without applying inventive step. He would arrive to independent claims 1, 7 and 16. He would reach, starting from D5 alone, claims 2-6, 8-14, 17-19 without applying inventive step.

Such systems are known from D2, for example. He would reach, in view of a combination of D5+D2, claims 1-6, 7-14, 16-19 also without applying inventive step.

- 3.2 Claims 15 and 20: Exhaust rocker arm causing the valve to follow a normal valve lift and a brake valve lift, pivoting on a deactivable HLA are known from D6 (see fig. 5b paragraph [0028]) or from D7 (see fig. 1, 2 and table 6 last line).
- 4 The subject-matter of claims 1-20 is industrially applicable.

### **Re Item VII**

- 5 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in D1-D5 is not mentioned in the description, nor are these documents identified therein.
- 6 Independent claims 1, 7 and 16 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art being placed in the preamble (Rule 6.3(b)(i) PCT) and the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).
- 7 The features of claims 1-20 are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

### **Re Item VIII**

- 8 Although claims 1-12 have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Article 6 PCT:

Indeed, claim 7 claims "a hydraulic system for a rocker arm assembly of an engine" whereas claim 1 claims "A hydraulic system for a rocker arm assembly". However, later in claim 1, the assembly is configured to operate an engine

valve. As a consequence, formulation "a hydraulic system for a rocker arm assembly of an engine" has exactly the same technical meaning than the formulation used in claim 1.

Moreover, claim 7 claims "an exhaust rocker arm having a first end and a second end, the first end configured to cooperate with an engine valve" whereas claim 1 claims "an exhaust rocker arm, configured to selectively open an engine valve". In the two known types of rocker arm (end pivot or center pivot), both comprise at least two ends (a third one can be to actuate another valve or a third one can contact another cam). Similarly, the two expressions have the same technical meaning.

Claims 1 and 7 have no other differences.

The same applies for claims 2-6 and 8-12.

- 9 Claims 1, 7 and 16 are not supported by the description as required by Article 6 PCT, as their scope is broader than justified by the description and drawings:

As explained above, terminology "exhaust rocker arm" covers the end pivot or center pivot rocker arm types, whereas the description and the figures only relate to the center pivot rocker arm type (see also paragraph [0018]).