

Internal distribution code:

- (A) Publication in OJ
(B) To Chairmen and Members
(C) To Chairmen
(D) No distribution

**Datasheet for the decision
of 10 December 2009**

Case Number: T 1882/07 - 3.2.06

Application Number: 01302584.6

Publication Number: 1149989

IPC: F01L 13/00

Language of the proceedings: EN

Title of invention:

Hydraulically actuated latching pin valve deactivation

Patentee:

Eaton Corporation

Opponent:

Schaeffler KG

Headword:

-

Relevant legal provisions:

-

Relevant legal provisions (EPC 1973):

EPC Art. 56

Keyword:

"Inventive step (yes)"

Decisions cited:

-

Catchword:

-



Case Number: T 1882/07 - 3.2.06

D E C I S I O N
of the Technical Board of Appeal 3.2.06
of 10 December 2009

Appellant: Schaeffler KG
(Opponent) Industriestrasse 1-3
D-91074 Herzogenaurach (DE)

Representative: DTS München
Patent- und Rechtsanwälte
St.-Anna-Strasse 15
D-80538 München (DE)

Respondent: Eaton Corporation
(Patent Proprietor) Eaton Center
1111 Superior Avenue
Cleveland
Ohio 44114-2584 (US)

Representative: Burke, Steven David
R.G.C. Jenkins & Co
26 Caxton Street
London SW1H 0RJ (GB)

Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted on 30 October
2007 rejecting the opposition filed against
European patent No. 1149989 pursuant to
Article 102(2) EPC.

Composition of the Board:

Chairman: P. Alting Van Geusau
Members: G. Pricolo
K. Garnett

Summary of Facts and Submissions

I. The appeal is from the decision of the Opposition Division posted on 30 October 2007 to reject the opposition filed against European patent No. 1 149 989 granted in respect of European patent application No. 01 302 584.6.

II. Claim 1 as granted reads as follows:

"1. A valve deactivator assembly (15) for an internal combustion engine of the type having valve means (33) for controlling the flow to and from a combustion chamber, drive means (37) for providing cyclical motion for opening and closing said valve means in timed relationship to the events in said combustion chamber, and valve gear means (27,15) operative in response to said cyclical motion to effect cyclical opening and closing of said valve means (33); said valve deactivator assembly (15) comprising part of said valve gear means (27,15) and including an outer body member (17) and an inner body member (19) disposed within said outer body member (17) and being reciprocable relative thereto, and a spring (41) biasing said inner body member (19) toward an axially extended position (FIG. 3) relative to said outer body member (17); a latch assembly wholly disposed within said inner body member (19) when said outer (17) and inner body members are in an unlatched condition, said latch assembly including a radially moveable latch member (63) and spring means (65) biasing said latch member (63) toward a latched condition; a source (23) of pressurized fluid operably associated with said latch assembly and operable to

bias said latch member (63) toward said unlatched condition; characterized by:

(a) said latch assembly further comprises said outer body member (17) defining a generally annular, internal groove (69) including an annular latch surface (71) and at least one fluid port (67) disposed in open fluid communication with said annular, internal groove (69) and in fluid communication with said source (23) of pressurized fluid;

(b) said latch member (63) defining a generally planar stop surface (75) oriented generally parallel to said annular latch surface (71) and disposed for face-to-face engagement therewith when said latch member (63) is in said latched condition, whereby said inner body member (19) may have any rotational orientation relative to said outer body member (17)."

III. In coming to its decision the Opposition Division held that the claimed subject-matter was novel and inventive over the available prior art including:

E1: US-A-5 655 487;

E2: US-A-5 419 290.

IV. Against this decision, the opponent lodged an appeal, received at the EPO on 17 November 2007, and simultaneously paid the appeal fee. The statement setting out the grounds of appeal was received at the EPO on 3 March 2008.

V. In an annex to the summons for oral proceedings pursuant to Article 15(1) of the Rules of Procedure of

the boards of appeal the Board expressed doubts as to whether E2 disclosed features (a) and (b) of claim 1.

VI. By letter dated 18 September 2009 the appellant (opponent) filed an expert report by Mr Herbert Büllmer in support of its arguments according to which E2 disclosed features (a) and (b) of claim 1.

VII. Oral proceedings, at the end of which the decision of the Board was announced, took place on 10 December 2009.

The appellant requested that the decision under appeal be set aside and that the European patent be revoked.

The respondent (patentee) requested that the appeal be dismissed.

VIII. The arguments of the appellant can be summarized as follows:

The closest prior art was represented by a valve deactivator assembly in accordance with document E1, in particular by an assembly as shown in Fig. 2. When the assembly was in its latched condition, the pistons provided in an inner body member engaged the bores provided in an outer body member. Accordingly, the inner body member had to be maintained at a predetermined rotational orientation with respect to the outer body member. The subject-matter of claim 1 of the patent in suit was distinguished from the known assembly by the features (a) and (b) recited in the characterizing portion of claim 1. Feature (a) allowed latching to occur with any orientation of the inner body member relative to the outer body member. This

feature was disclosed by E2, which related to a similar assembly for valve deactivation. Although E2 did not explicitly mention it, it was clear for the skilled person that an advantage of the provision of an annular groove instead of bores was that latching could occur irrespective of the rotational orientation of the inner body member relative to the outer body member. Therefore, E2 would suggest to the skilled person the modification of the assembly of E1 consisting of replacing the bores in the outer body member with an annular groove. In accordance with E1, the predetermined rotational orientation was necessary not only for allowing the pistons of the inner body member to engage the bores of the outer body member, but also for allowing alignment of hydraulic channels in the bodies and thus allowing fluid passage through the bodies. When modifying the assembly of E1 for allowing latching in any rotational orientation of the inner body member relative to the outer body member, the skilled person would obviously consider adapting the hydraulic passages such as to also permit fluid passage in any rotational orientation. This was a matter of normal design procedure. Finally, assuming that E2 did not disclose feature (b) of claim 1, the skilled person would recognize that by providing an annular groove in the assembly of E1 instead of bores, the cylindrical pistons should be replaced by pistons having a planar stop surface in order to avoid linear contact.

IX. The respondent's reply can be summarized as follows:

The Figures of E2 were merely schematic in nature and so it was not possible to deduce from them precise information about the shape of the latch member, or of

the shoulder which, according to the appellant, was an annular groove. In any case, even if features (a) and (b) of claim 1 were disclosed by E2, there was no disclosure of any advantages associated with them. Then, without there being any motivation in E2 to do so, the skilled person would have to isolate these features from the remainder of the latching arrangement in E2 to incorporate only these two features in E1 whilst excluding the rotational fixing of E1. The rotational fixing was a feature necessary for supplying hydraulic fluid within the assembly of E1. Therefore, the combination of E1 with E2 suggested by the appellant could only be achieved with the benefit of hindsight.

Reasons for the Decision

1. The appeal is admissible.

2. Document E1, which is acknowledged in the patent in suit (see par. [0006]), undisputedly represents the closest prior art. This document, in the embodiment according to Fig. 2, discloses a valve deactivator assembly according to the preamble of claim 1 of the patent in suit, namely (reference is also made to Fig. 1, for those details that are not represented in Fig. 2) a valve deactivator assembly for an internal combustion engine of the type having valve means for controlling the flow to and from a combustion chamber, drive means for providing cyclical motion for opening and closing said valve means in timed relationship to the events in said combustion chamber, and valve gear means operative in response to said cyclical motion to effect cyclical opening and closing of said valve means

(see col. 1, lines 3 to 21); said valve deactivator assembly comprising part of said valve gear means and including an outer body member (the portion of cylinder head 5 with reception bore 4) and an inner body member (housing 2) disposed within said outer body member (5) and being reciprocable relative thereto (col. 4, lines 7 to 9), and a spring (9) biasing said inner body member toward an axially extended position (best seen in the right-hand side of Fig. 1) relative to said outer body member (5); a latch assembly wholly disposed within said inner body member when said outer and inner body members are in an unlatched condition, said latch assembly including a radially moveable latch member (piston 14) and spring means (16) biasing said latch member (14) toward a latched condition; a source of pressurized fluid operably associated with said latch assembly and operable to bias said latch member toward said unlatched condition (see col. 3, line 67 to col. 4, line 9).

It is noted that the housing 2 of the assembly according to E1 cannot be regarded as the outer body member in accordance with the wording of claim 1, even though it is an outer member relative to the inner member 8. As a matter of fact it is the housing 2 that, as required by claim 1 for the inner body member, is biased towards an axially extended position. The inner member 8 is substantially unmovable (apart from small displacements due to the presence of the clearance compensation element 11).

3. The subject-matter of claim 1 differs from the known valve deactivator assembly by the following features:

(a) said latch assembly further comprises said outer body member defining a generally annular, internal groove including an annular latch surface and at least one fluid port disposed in open fluid communication with said annular, internal groove and in fluid communication with said source of pressurized fluid;

(b) said latch member defining a generally planar stop surface oriented generally parallel to said annular latch surface and disposed for face-to-face engagement therewith when said latch member is in said latched condition,

whereby said inner body member may have any rotational orientation relative to said outer body member.

4. The provision of an annular internal groove in accordance with feature (a) allows latching to occur irrespective of the rotational orientation of the inner body member relative to the outer body member. For latching to occur there is therefore no need to secure the inner body member and the outer body member against rotation relative to each other. Although E1 discloses that the inner body member 2 is secured against rotation relative to the to outer body member 5 (see col. 4, lines 59, 61), in the embodiment of Fig. 2 of E1 latching (i.e. engagement of pistons 14 in bores 13) can occur irrespective of the rotational orientation of the inner body member 2 relative to the outer body member 5, since the inner body member 2 latches with the inner member 8 and not with the outer body member 5. Moreover, as pointed out by the appellant during the oral proceedings, the presence of an annular groove 26 in the outer body member (see col. 4, lines 17 to 22) allows transfer of oil from supply duct 21 irrespective of the rotational orientation of the inner body member

2 relative to the outer body member 5. Accordingly, feature (a) results in a different construction of the latching mechanism. Providing feature (b) in the assembly according to E1 means that the pistons 14 can contact the latch surface over a larger area, thereby reducing surfaces stresses in the latch mechanism (see the patent in suit, col. 2, lines 25 to 32). Accordingly, the mechanical resistance of the assembly can be improved.

It follows that the distinguishing features solve the objective technical problem of providing an alternative construction of the latching mechanism which has an improved mechanical resistance.

5. The appellant referred to document E2. Using the wording of claim 1 of the patent in suit, this document discloses a valve deactivator assembly (see col. 8, line 13) including (see Figs. 4 to 6) an outer body member (68) and an inner body member (66) disposed within said outer body member and being reciprocable relative thereto; a latch assembly (73, 74) wholly disposed within said inner body member when said outer and inner body members are in an unlatched condition (Fig. 4), said latch assembly including a radially moveable latch member (73, 74); a source of pressurized fluid operably associated with said latch assembly and operable to bias said latch member toward said unlatched condition (see col. 5, lines 38 to 41). According to E2, the latch members (73, 74) are pistons that, in the latched condition, engage a latch surface provided in the outer body member (sleeve 68). E2 discloses that the latch surface is formed by two opposed and aligned apertures, or alternatively by a

circumferential recess (see col. 4, lines 40 to 42). The Board agrees with the appellant's view that, in the absence of any indication to the contrary, the only reasonable interpretation of the term "circumferential recess" is a recess extending around the circumference of the outer body member. Accordingly, E2 discloses that the outer body member (68) comprises a generally annular, internal groove (72) including an annular latch surface. Since E2 further discloses at least one fluid port (79) disposed in open fluid communication with said annular, internal groove and in fluid communication with said source of pressurized fluid, E2 discloses feature (a) of claim 1 of the patent in suit. As regards feature (b), E2 discloses that the latch member (pistons 73, 74) defines a stop surface oriented generally parallel to said annular latch surface (72) and disposed for face-to-face engagement therewith when said latch member (73, 74) is in said latched condition. Claim 1 requires that said stop surface be "generally planar". In this respect, the Board agrees with the view of the Opposition Division (see the penultimate paragraph on page 10 of the decision under appeal), according to which E2 does not clearly and unambiguously disclose a flat surface on the shoulder (76) of the latch member (piston 74). In fact, even taking into consideration the expert report by Mr Herbert Büllmer, it cannot be excluded, when considering the drawings of Figs. 4 to 6, that a lower portion of the piston 74 below line 6-6 in Fig. 5 forms an arched surface. However, since the radius of such an arched surface would necessarily be relatively large, the arched surface could be regarded as a "generally" planar stop surface, as submitted by the appellant. This issue can however be left open because, even

assuming that feature (b) of claim 1 is known from E2, the disclosure of E2 would not lead the skilled person in an obvious manner to the subject-matter of claim 1 of the patent in suit, for the following reasons.

6. As mentioned above, E2 discloses a latch surface consisting of two opposed and aligned apertures, or alternatively a circumferential recess (see col. 4, lines 40 to 42). These alternatives are presented as equally valid since there is no indication in E2 that the second alternative is preferred or that it might have advantages, in particular in terms of mechanical resistance. The skilled person faced with the above mentioned technical problem would therefore have no reason for modifying the assembly according to E1 which includes (see Fig. 2 of E1) distinct apertures (13) for the latch members (pistons 14).

Furthermore, providing, in the embodiment according to Fig. 2 of E1, a circumferential recess which forms an annular latch surface for the latch members, implies replacing the radial bores 13 in the inner body member 2 by a circumferential recess into which the pistons 14 can extend. This is different from providing a circumferential recess in the outer body member (i.e. in the bore 4 of the cylinder head 5 of E1) as required by claim 1 of the patent in suit. Moreover, the skilled person would regard such modification as inappropriate in the technical context of E1. In fact, in the assembly according to E1, the inner body member 2 must be maintained in a predetermined rotational orientation with respect to the inner member 8 which carries the latch members (pistons 14), since the radial bore 22 in the inner body member 2 must communicate with the

radial bore 23 in the inner member 8 in order to supply oil to the clearance compensation element 11. Means (pin 28, see Fig. 5) for preventing rotation of the inner body member 2 relative to the inner member 8 are indeed provided in the assembly of E1 (see col. 4, lines 59 to 65). Similar considerations apply for the other embodiments of E1. As a matter of fact, in all the embodiments according to E1, the latch surfaces (bores) for the latch members (pistons 14) are provided in the inner body member (either in the housing 2 as in Fig. 2, or in the inner portion 8 as in Fig. 1), and therefore there is no reason why the skilled person would consider providing an annular latch surface for the latch members in the outer body portion 5. Moreover, in all these embodiments, relative rotation between the element carrying the latch members (pistons 14) and the element carrying the latch surfaces must be prevented, so that the radial bore 22 in the inner body member 2 always faces the radial bore 23 in the inner member 8 and oil is supplied to the clearance compensation element 11. Accordingly, the provision of a circumferential recess forming an annular latch surface for the pistons 14 would be regarded as technically inappropriate.

7. It follows from the above, that the subject-matter of claim 1 and that of dependent claims 2 to 7 involves an inventive step (Article 56 EPC 1973).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

M. Patin

P. Alting van Geusau