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D E C I S I O N
of 17 May 2005

Case Number: T 1292/04 - 3.2.4

Application Number: 99850149.8

Publication Number: 0997615

IPC: F01L 13/08

Language of the proceedings: EN

Title of invention:

Automatic decompression valve for an internal combustion engine

Applicant:

AB ELECTROLUX

Opponent:

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Headword:

-

Relevant legal provisions:

EPC Art. 56, 123(2)

Keyword:

"Novelty (yes)"
"Inventive step (no)"

Decisions cited:

-

Catchword:

-



Case Number: T 1292/04 - 3.2.4

D E C I S I O N
of the Technical Board of Appeal 3.2.4
of 17 May 2005

Appellant: AB ELECTROLUX
Applicant: Luxbacken 1
S-105 45 Lilla Essingen (Stockholm) (SE)

Representative: Svahn, Göran
AB Electrolux
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S-105 45 Stockholm (SE)

Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 6 August 2004
refusing European application No. 99850149.8
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: M. Ceyte
Members: C. Scheibling
T. Bokor

Summary of Facts and Submissions

- I. By its decision dated 6 August 2004 the Examining Division rejected the patent application. On 22 September 2004 the Appellant (applicant) filed an appeal, the statement setting out the grounds of appeal and paid the appeal fee simultaneously.
- II. The Examining Division considered that the subject-matter of claim 1 did not involve an inventive step when compared with D1: US-A-4 619 228 taking into account the common knowledge of a skilled person as illustrated by D2: US-A-5 375 570.
- III. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of claims 1 to 3 filed with the statement setting out the grounds of appeal.
- IV. Claim 1 reads as follows:

"1. Automatic valve for reducing compression during start of a two-stroke internal combustion engine provided with a crankcase and an intake tube, comprising a movable valve (25) adapted to control a gas flow through an opening (16) in a wall of the combustion chamber of the engine, a resilient means (27) for moving said movable valve (25) to an open position, and a driver actuated by an underpressure and adapted to move said movable valve (25) to a closed position against the action of said resilient means (27), characterized in that the driver comprises a cylinder (18) and a piston (19), said piston being movable in said cylinder (18) and connected to said

movable valve (25), a conduit (22) connecting said cylinder (18) to a source of underpressure, a one-way valve (23) provided in said conduit (22) for allowing an air flow in a direction away from said cylinder (18) and for preventing air flow in a direction towards said cylinder, and a leak passage (30) adapted to allow a controlled air flow of atmospheric air to pass the piston (19) into said cylinder to facilitate opening of said movable valve (25) when the operation of the engine has been stopped. "

- V. The Appellant mainly argued that the subject-matter of claim 1 differs from the one disclosed in D1 in that the claimed driver comprises a piston and not a diaphragm as in D1 and in that there is a leak passage adapted to allow a controlled air flow of atmospheric air to pass the piston into said cylinder and not a passage bypassing the one-way valve in the conduit between the crankcase and the driver as in D1.

The objective problem solved by these differences is that clogging of the leak passage can be avoided, which makes the claimed valve more reliable than the arrangement disclosed in D1.

Therefore, the automatic valve according to claim 1 involves an inventive step in comparison with D1.

Reasons for the Decision

1. The appeal is admissible.

2. Amendments:

2.1 Claim 1 now on file differs from claim 1 as originally filed by the following modifications:

The feature "provided with a crank case and an intake tube" has been added to "combustion engine".

The expressions "valve means", "drive means", "comprises a cylinder (18), a piston (19) movable in said cylinder", "for allowing an air flow in a direction from said cylinder (18) only" have been amended to read "movable valve", "driver", "comprises a cylinder (18) and a piston (19), said piston being movable in said cylinder", "for allowing an air flow in a direction away from said cylinder (18) and for preventing air flow in a direction towards said cylinder".

The features of claim 4 as originally filed have been included in claim 1 so that the expression "and a leak passage (30) adapted to allow a small flow of atmospheric air into said cylinder (18) for facilitating the opening of said valve means (25)..." reads "and a leak passage (30) adapted to allow a controlled air flow of atmospheric air to pass the piston (19) into said cylinder to facilitate opening of said movable valve (25)..."

These modifications further limit claim 1 and do not introduce new subject-matter.

2.2 Claim 2 has been amended by the addition of the following feature: "that the crankcase of the engine is the source of underpressure". This feature is disclosed in the application as originally filed, page 2, lines 24 to 28.

2.3 Thus, the amendments made do not contravene the requirements of Article 123(2) EPC.

3. *Novelty:*

None of the documents cited in the search report discloses in combination all the features of claim 1.

Consequently, the subject-matter of claim 1 is new with respect to said documents.

4. *Inventive step:*

4.1 D1 is considered to be the closest prior art document.

4.2 D1 (column 1, lines 7 to 14; column 2, line 53 to column 3, line 27; column 4, line 54 to column 5, line 30; Figures 1 and 2) discloses an automatic valve (16) for reducing compression during start of a two-stroke internal combustion engine (10) provided with a crankcase (13) and an intake tube, comprising a movable valve (17) adapted to control a gas flow through an opening (14) in a wall of the combustion chamber of the engine, a resilient means (22) for moving said movable valve (17) to an open position, and a driver actuated by an underpressure and adapted to move said movable valve (17) to a closed position against the action of said resilient means (22), wherein the driver comprises

a cylinder and a pressure responsive element in form of a diaphragm (21), which is movable in said cylinder and connected to said valve (17), a conduit (30) connecting said cylinder to a source of underpressure, a one-way valve (34) provided in said conduit (30) for allowing an air flow in a direction away from said cylinder and for preventing air flow in a direction towards said cylinder, and a leak passage (35) adapted to allow a controlled air flow of atmospheric air (column 5, lines 22 to 24) to pass into said cylinder to facilitate opening of said movable valve (17) when the operation of the engine has been stopped.

4.3 Thus, the automatic valve according to claim 1 differs from that disclosed in D1 in that:
the pressure responsive element is a piston, and
the leak passage allows atmospheric air to pass the piston into said cylinder.

4.4 The application in suit acknowledges prior art valve designs adapted to automatic operation and points out that these prior art valves do not operate satisfactorily (page 1, lines 12 and 13). The problem to be solved is therefore to avoid the problems and disadvantages encountered in connection with prior art valve designs and to provide a valve having a good reliability and operability in practical use (page 1, lines 15 to 17).

The Appellant argued that the objective problem is to make the claimed valve more reliable than the arrangement disclosed in D1 and referred to two alleged drawbacks of the arrangement according to D1. The first one is that the passage has a small diameter (0.3 mm)

and can easily get clogged; the second one is that pressure pulses in the crankcase increase the risk for fuel to be introduced in the flow path and in the diaphragm chamber, so that entire diaphragm chamber is filled with liquid.

However, these arguments do not appear to be persuasive since, in D1, column 5, lines 31 to 34 it is indicated "Plugging of the orifice 35 is not a problem due to the fact that it is in a clean environment, and also since there is a pulsating gas flow therethrough, which will effect cleaning."

Furthermore, since the crankcase is alternately submitted to pressure and vacuum, there is no reason why liquid should be "pumped" through the leak passage into the diaphragm chamber, since no one-way valve is present to avoid that liquid, which possibly has been pushed through the leak passage when the crankcase is under pressure, is drawn back into the crankcase when it is submitted to vacuum.

Thus, there is no indication in D1 which could lead to the conclusion that the valve disclosed therein should encounter reliability problems or should not operate satisfactorily.

Therefore, starting from D1 as closest prior art document, the objective problem to be solved can only be seen in providing another valve design which is at least so reliable as the design known from D1.

4.5 However, it has not been contested by the Appellant that there are only two types of pressure responsive elements commonly used in fluidic equipments to generate a movement in response to a pressure difference, i.e. pistons and diaphragms.

Furthermore, D1 discloses a leak passage to facilitate the opening of the valve when the operation of the engine has stopped. It is obvious that said leak passage has to communicate with the volume enclosed by the pressure responsive element, the cylinder, the conduit and the one-way valve. However, there are little possibilities to provide a leak passage which leads into said volume. In fact, the sole possibilities are to by-pass the pressure responsive element or the one-way valve or to provide the leak passage directly in the cylinder or in the conduit.

4.6 The Appellant argued that it is not self-evident to provide the valve of D1 with a piston because of the friction losses. However, it is common knowledge for a skilled person that friction losses are mainly due to the gasket and can be minimised by selecting an adequate type of gasket (if any gasket is to be used at all). Furthermore, there is no evidence that the force necessary to overcome said friction is significantly different from the force that a diaphragm normally opposes to deformation due to its elasticity. Therefore, there is no reason why friction losses should deter a skilled person from using a piston instead of a diaphragm.

The Appellant also stated that "we have chosen to use a piston that operates in a cylinder with a slot that admits passage of a small gas flow" and alleged that the claimed leak passage avoids clogging.

However, neither claim 1 nor the description refer to "a slot". The description (page 3) refers to the fact that "the piston has a small gap", whereas claim 1 states that there is "a leak passage adapted to allow a controlled air flow ... to pass the piston", but does not indicate how this leak passage is configured. Since any leak passage design will not result in avoiding clogging, the claimed leak passage cannot be said to provide the alleged advantage.

The Appellant finally referred to the fact that "these engines are frequently used in for example hand held tools that are sometimes transported and used in a rough environment" and that the way the leak passage is located contributes to more reliability under these operating circumstances. This problem is however already solved by D1 which places the leak passage in a "clean environment" (see column 5, lines 31 to 34) whereas in the patent application in suit, the leak passage is in direct communication with the said rough environment. Therefore, to locate the leak passage as claimed does not necessarily provide the alleged advantage.

- 4.7 Therefore, to use a piston instead of a diaphragm and to by-pass the piston rather than the one-way valve is merely one of the few obvious possibilities from which a skilled person would select according to the circumstances, without the exercise of inventive skill.

Thus, the subject-matter of claim 1 does not involve an inventive step.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

G. Magouliotis

M. Ceyte