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Datasheet for the decision of 7 October 2008

Case Number: T 1076/05 - 3.3.05

Application Number: 98928801.4

Publication Number: 0989900

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Language of the proceedings: EN

Title of invention:
An air drier arrangement

Patentee:
Haldex Brake Products AB

Opponent:
WABCO GmbH

Headword:
Air drier/HALDEX

Relevant legal provisions:
EPC Art. 56

Relevant legal provisions (EPC 1973):
-

Keyword:
"Inventive step (all requests): no"

Decisions cited:
-

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Case Number: T 1076/05 - 3.3.05

D E C I S I O N
of the Technical Board of Appeal 3.3.05
of 7 October 2008

Appellant: (Opponent)
WABCO GmbH
Am Lindener Hafen 21
D-30453 Hannover (DE)

Representative:
Schrödter, Manfred
WABCO GmbH
Postfach 91 12 62
D-30432 Hannover (DE)

Respondent: (Patent Proprietor)
Haldex Brake Products AB
P.O. Box 501
S-261 24 Landskrona (SE)

Representative:
Rehberg Hüppe + Partner
Patentanwälte
Postfach 31 62
D-37021 Göttingen (DE)

Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 30 June 2005 rejecting the opposition filed against European patent No. 0989900 pursuant to Article 102(2) EPC.

Composition of the Board:

Chairman: G. Raths
Members: B. Czech
S. Hoffmann

Summary of Facts and Submissions

I. This appeal is from the decision of the opposition division rejecting the opposition filed against European patent No. 0 989 900.

II. Claim 1 of the patent in suit reads as follows:

"*1. An air drier arrangement, comprising an air compressor (1), an air drier (3), an air conduit (2) from the compressor to the air drier and an air conduit (4) from the air drier to an air tank or an air consumer, characterized in that in a separate signal air pipe (5) from the air drier (3) to the compressor (1) there is a switch-over valve (6), operable between a first position, in which air passes through the valve for accomplishing a so called governor mode for the arrangement, and a second position, in which the air pipe (5) from the air drier (3) is closed and the air pipe to the compressor (1) is open to the atmosphere for accomplishing a so called unloader mode for the arrangement.*"

III. In the contested decision, the opposition division concluded that the subject-matter of claim 1 as granted was novel and inventive in view of the prior art cited by the opponent, which includes inter alia the following documents:

D1: WO 91/16224 A1
D2: DE 39 23 882 A1
D4: Excerpts from three editions of the "Kraftfahrtechnisches Taschenbuch", Robert Bosch GmbH, namely

D4a: 19th edition , 1984, p. 514 to 515
D4b: 21st edition, 1991, p.620 to 643
D4c: 22th edition, 1995, p.652 to 655

IV. In its statement of grounds of appeal, the appellant (opponent) argued that the subject-matter of claim 1 was not based on an inventive step, irrespective of whether D1 or D2 was taken as the starting point.

V. In its reply, the respondent (proprietor of the patent) requested the rejection of the appeal (main request). Alternatively, it requested the maintenance of the patent on the basis of one of the sets of claims considered in the decision under appeal (auxiliary requests I to III). The respondent argued that the claimed subject-matter was not obvious in view of D1 and D2.

VI. The parties were summoned to oral proceedings. In a communication, the board inter alia commented on the terminology used in the patent in suit and on the allowability of amendments in the claims according to the auxiliary requests.

VII. Oral proceedings were held on 7 October 2008, during which the respondent replaced its three auxiliary requests I to III previously on file by auxiliary requests 1 to 3.

Claim 1 according to auxiliary request 1 differs from claim 1 as granted in that the latter was amended to read as follows (amendments **highlighted** by the board):

"*1. An air drier arrangement* ***to be mounted on a vehicle****, comprising an air compressor (1), an air drier (3)* ***including an unloader valve****, an air conduit (2) ..., characterized in that ... for the arrangement.*"

Claim 1 according to auxiliary request 2 differs from claim 1 as granted in that the latter was amended to read as follows (amendments **highlighted** by the board):

"*1. An air drier arrangement, ... , characterized in that in a separate signal air pipe (5) from the air drier (3) to the compressor (1) there is a* ***an electrically operated*** *switch-over valve (6), operable between ... for accomplishing a so called unloader mode for the arrangement,* ***and in that a thermostat (9) being provided in an electric line (7) to the switch-over valve (6) is located at the air drier****.*"

Claim 1 according to auxiliary request 3 differs from claim 1 as granted in that the latter was amended to read as follows (amendments **highlighted** by the board):

"*1. An air drier arrangement* ***to be mounted on a vehicle****, comprising an air compressor (1), an air drier (3)* ***including an unloader valve****, an air conduit (2) ... , characterized in that in a separate signal air pipe (5) from the air drier (3) to the compressor (1) there is a* ***an electrically operated*** *switch-over valve (6), operable between ... for accomplishing a so called unloader mode for the arrangement,* ***and in that a thermostat (9) being provided in an electric line (7) to the switch-over valve (6) is located at the air drier****.*"

In the course of the oral proceedings, the respondent also filed the further document

D5: "Commercial Vehicle Braking Systems: Air brakes, ABS and Beyond"; Buckman, L. C.; SAE International SP-1405; November 1998.

VIII. The arguments of the parties which are relevant for the present decision can be summarised as follows:

The appellant argued that starting from document D2 as the closest prior art, the arrangement as claimed (all requests) was not based on an inventive step in view of D1. According to D2, the arrangement disclosed therein, which implicitly comprised a drier in view of its intended applications, was, on the one hand, energy saving due to the periods of compressor standstill. On the other hand, freezing of the air conduit at low temperatures was prevented by operating the arrangement in an "*unloader mode*" in the sense of the patent in suit. D2 disclosed an arrangement operable in two different modes during periods requiring no further supply of compressed air to the tank. Switching between the said modes was accomplished by means of a signal air pipe comprising a switch-over valve. The technical problem could thus merely be seen in providing an alternative arrangement. The solution proposed by the patent in suit was obvious in view of D1. D1 disclosed a compressor operated in a "*governor mode*" in the sense of the patent in suit and the skilled person would realise e.g. in view of D1 that energy savings aimed at according to D2 could also be achieved by unloading the compressor instead of bringing it to a halt using a clutch. It emanated from D1 that the governor

controlling the compressed air output of the compressor could act on either an unloader mechanism of the compressor or on a clutch. Hence, the skilled person would consider replacing the compressor control mode (clutch) described in D2 by a mode wherein the compressor itself was unloaded but kept running, which mode was also generally known from e.g. D4. Concerning the auxiliary requests 2 and 3, the appellant questioned the allowability of the amendments and argued that the skilled person would arrange the thermostat at a suitable position without any inventive skills being involved.

According to the respondent, the reference to the "*governor mode*" implied that the compressor itself comprised an unloading mechanism not shown in the figure of the patent in suit. In the unloaded state of the compressor, the latter was running, but no air was flowing in the conduit to the drier due to the construction of the unloader mechanism. In this connection, it referred to documents D1, D4 and D5 and to the text of the patent in suit. D1 also disclosed a mode wherein the compressor was stopped by means of a clutch, but this was not to be regarded as a "*governor mode*". The mode designated as "*unloader mode*" or "*online unloader mode*" in the patent in suit referred to one and the same mode which implied the presence of an unloader valve as part of the drier. Concerning this mode, it referred to documents D2, D4a-c and D5 and to the text of the patent in suit.

D2 disclosed an arrangement which saves a little more energy than the one according to the patent in suit, since the compressor was stopped at higher

temperatures, but it required a further component, namely a clutch. Starting from the arrangement according to D2 as the closest prior art, the skilled person not knowing the present invention had no reason to deviate from the most energy saving arrangement disclosed therein. The arrangement as claimed was less energy saving but it did not require a clutch. Using a clutch to disable the compressor was a concept which had nothing to do with the ways in which a constantly running compressor could be operated i.e. with or without air flow from the compressor into the compressed air conduit. Nothing in the prior art suggested to combine the two well known modes in a same arrangement. Moreover, since according to the invention the compressor was kept running permanently, problems associated with carbon particles leaking from the compressor could be avoided and the compressed air conduit was always warmed to some extent, even in the absence of air flow through it. Concerning D2, the respondent also observed that there was no disclosure of a drier, only a filter symbol being shown in the figures.

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

The respondent requested that the appeal be dismissed, or, in the alternative, that the patent be maintained in amended form on the basis of one of the three auxiliary requests filed during the oral proceedings.

Reasons for the Decision

Main request

1. Claim 1 - Meaning of the terms

1.1 Claim 1 refers in functional terms to two different operating modes of the claimed arrangement, namely a "*so called governor mode*" and a "*so called unloader mode*". These expressions are not self-explanatory in terms of the constructional features of the arrangement they are supposed to imply, and it is not apparent from the cited documents that they have a generally accepted and precise meaning in the field of compressed air generation. Hence, their meaning is construed in the light of the description of the patent in suit.

1.2 In the description of the patent in suit, the "*unloader mode*" referred to in claim 1 is also designated as "*online unloader mode*". It is expressly indicated (see sections [0004] and column 2, lines 32 to 37) that when the arrangement is in this particular mode, "*non-pressurized air blows through said conduit from the compressor and out into the atmosphere* ***via the unloader valve of the air drier***". The board thus accepts that the arrangement must implicitly comprise an unloader valve (not shown in the figure) suitable for this purpose and forming part of the air drier.

1.3 Concerning the "*governor mode*", it is specified in the description of the patent in suit that when the arrangement is in this mode, "*the air flow stops when the* ***compressor*** *is* ***unloaded***" (see column 1, lines 20 to 21; emphasis added), "*the air flow from the compressor*

*1 ceases in **its unloaded state**, i.e. when no further air is needed*" (column 2, lines 19 to 21; emphasis added) and "*the **compressor** 1 only **works** when more air is needed*" (column 2, lines 24 to 26; emphasis added). In view of these indications, the board accepts that the reference to the "*governor mode*" in claim 1 implies that the **compressor** of the claimed arrangement **itself** must comprise a conventional compressor unloading mechanism as referred to e.g. in D1 (see Figure 1, reference number 18, and page 3, lines 12 to 17), examples of which are described e.g. in D4a (page 514, left-hand column, last paragraph), D4b (page 634, left-hand column, 2nd paragraph), D4c (page 654, left-hand column, 3rd paragraph) and D5 (post-published; page 24, right-hand column 2nd paragraph). Such a conventional unloading mechanism does not bring the compressor to a halt but unloads it in such a manner that the compressor itself keeps on running, but without compressing air. In accordance therewith, document D1 (see Figure 1; page 1, lines 14 to 23; page 3, lines 10 to 24; page 5, lines 14 to 22) distinguished between the unloading/loading of a compressor using a conventional unloader 18 and the disabling/enabling of the compressor by engagement/disengagement of a clutch mechanism powering it.

2. Inventive step - claim 1

2.1 The patent in suit (see section [0001] relates to an arrangement for providing dry compressed air to an air tank or consumer, the arrangement comprising an air compressor, an air drier, an air conduit from the compressor to the air drier and an air conduit from the air drier to an air tank or an air consumer. The

arrangement according to the patent in suit is supposed to combine the advantages of previously known arrangements in terms of energy saving ability and efficiency at low temperatures. To achieve these advantages the arrangement is alternately operated in two different control modes (see sections [0002] to [0006]).

2.2 D2 also relates to arrangements for providing compressed air to a storage container or air consumer, in particular in vehicles operating at low ambient temperatures (see e.g. the abstract and claim 1 of D2). Depending on the ambient temperatures, the arrangement of D2 is alternately operating in one of two control modes. In view of these similarities - in terms of construction and purpose - of the arrangements disclosed in D2 and the one according to claim 1 of the patent in suit, the board concurs with the parties that D2 represents a reasonable starting point for the assessment of inventive step.

2.2.1 More particularly, D2 discloses an arrangement (see Figure 1) comprising a compressor 1, an air tank/consumer 6 and an air conduit 4/7 leading from the compressor to the air tank. The compressor comprises a clutch 2 for coupling it to a drive 3. The clutch 2 comprises a pneumatic control inlet port ("Steuereinlaß") 11. In the air conduit 4/7, a pressure regulator 5 ("Druckregler") is arranged for controlling the air pressure in the tank 6. The air pressure in the tank 6 is thus governed by the pressure regulator 5. The latter comprises a valve 28 which opens to the atmosphere at 28 in response to the pressure prevailing in line 7 leading to the storage tank or air consumer 6.

An air signal pipe 9/10 leads from the pressure regulator 5 to the control inlet port 11 of the clutch 2.

2.2.2 A temperature-controlled electrically operated switch-over valve 12 is arranged in pipe 9/10, which valve is operable between two positions. These two valve positions correspond to two modes in which the arrangement may alternately operate when no further compressed air is needed, e.g. when tank 6 is full. In the first position of the switch over valve 12 (see schematic representation of the valve ports in Figure 1), the conduit part 9 from the pressure regulator 5 to the valve is closed and the conduit part 10 from the valve to the inlet control port 11 is open to atmosphere. The compressor is powered via the clutch mechanism and air flows through conduit 4 and out into the atmosphere via valve 28. Reference is made in particular to D2, Figure 1, column 1, line 67 to column 2, line 53 and column 3, lines 22 to 66. It was common ground between the parties that when the valve is in this first position, the arrangement is in an "*unloader mode*" in the sense of the patent in suit.

2.2.3 In the second position (shown in Figure 1 of D2) of the switch-over valve 12, pressurised air reaches the control inlet port 11 of the clutch 2 via pipe 9/10, thereby disengaging the compressor 1 from its drive and bringing the former to a halt (disabling it). When the switch-over valve is in this second position, the flow of air from the compressor 1 into the air conduit 4 is thus stopped. However, since this is not achieved by the means of a conventional compressor unloader mechanism responsive to the pressure in the signal air

signal air pipe 9/10, the arrangement is not brought into a "*governor mode*" in the sense of the patent in suit. Moreover, D2 is silent about the presence of a drier. The figures of D2 show the symbol for a filter as a component of the pressure regulator 5 but not the symbol for a drier. Considering that for instance in the field of compressed air braking systems a distinction is made between air purification devices ("Luftreiniger") and air driers (see e.g. D4b, page 634, left-hand column, 4th paragraph), the board does not accept the appellant's allegation that D2 implicitly discloses such a drier, let alone a drier incorporating the unloader valve 28.

2.3 According to the patent in suit [see section 0006], the object of the invention is to combine the advantages of two well-known control modes, i.e. the "*governor mode*" and the "*unloader mode*" as referred to in the introductory part of the description. In the board's view this formulation of the technical problem is not permissible since it contains elements of the solution (combination of the two modes). According to the introductory part of the description (section [0002] to [0005]) an advantage of the "*governor mode*" is its energy saving ability. In the "*unloader mode*" the air conduit is kept at an even temperature, most often above the freezing point, also at low temperatures. Further the conduit and the air drier are blown clean from water that can freeze to ice. Based on these indications, the problem as formulated in the patent in suit could thus be considered to consist in the provision of an arrangement for providing compressed air which also at low temperatures is both energy saving and efficient.

However, these two advantages are already achieved in combination with the arrangement disclosed in D2. The two advantages are expressly addressed by the authors of D2 (see column 1, lines 22 to 24 and 27 to 44). In periods where there is no demand for further compressed air, the arrangement of D2 operates in an "*unloader mode*" when the ambient temperature is low, thereby avoiding the problems that would otherwise occur under these conditions. At higher temperatures, when the latter problems cannot occur, the arrangement works in a mode which is energy saving, since the compressor is disabled by disengagement of the clutch in periods where there is no need for further compressed air. In the light of D2, the technical problem underlying the patent in suit thus consists in providing an energy-saving arrangement efficient at low temperatures providing compressed air which is drier than that obtained using the arrangement of D2.

2.4 According to claim 1 of the patent in suit, the solution to this technical problem consists in the incorporation of a drier which (implicitly, see point 1.2 above) comprises the unloader valve required for operating the arrangement in the unloader mode, in using a compressor comprising (implicitly; see point 1.3 above) a conventional unloader mechanism and in arranging the air signal pipe such that it may act on the latter mechanism to bring the arrangement in the governor mode.

2.5 The stated technical problem is credibly und undisputedly solved by this claimed solution.

2.6 Hence, it remains to be assessed whether the claimed solution to the stated technical problem is obvious in view of the cited prior art.

2.6.1 Where the intended use of the compressed air produced requires the air to be of certain dryness independently of the prevailing atmospheric conditions, some kind of drying must take place during the conditioning of the air before it reaches the point where it is consumed. It was not disputed and it is apparent from e.g. documents D4a (page 514, right-hand column, 2nd paragraph), D4b (page 634, left-hand column, 4th paragraph) and D4c (page 654, left-hand column, 5th paragraph) which like D2 pertain to the field of arrangements for providing compressed air on board of vehicles, that for this purpose the provision of a dryer in the conduit leading from the compressor to the tank/consumer belongs to the common general knowledge in said technical field, which drier may be integral with the pressure regulator (see the quoted passages of D4b and D4c). The skilled person starting from D2 and confronted with the stated technical problem would thus be prompted by his common general knowledge to incorporate a drier with a pressure regulator between the compressor and the tank/consumer of the arrangement described in D2.

2.6.2 The skilled person starting from D2 and being aware of document D1 pertaining to the same technical field (see page 1, line 4 to page 2, line 20; page 3, line 12) will realise that the use of a governor responsive to pressure in the compressed air storage tank either to unload the compressor itself or to disable it by means of a clutch are two possible alternatives for

controlling the compressor in periods where no further compressed air is needed (see D1, page 3, lines 10 to 24 and page 5, lines 13 to 22). The skilled person would realise that using a compressor with an unloading mechanism, i.e. keeping the compressor running permanently, would only consume a little more energy. The skilled person confronted with the stated technical problem was thus prompted by D1 to modify the arrangement of D2 such as to achieve the operating mode without flow of compressed air into the conduit by using a conventional compressor with a conventional unloading mechanism, the latter - and not a clutch - being activated/deactivated by means of the signal air pipe and the switch-over valve.

2.6.3 There is no obstacle which would keep the skilled person from doing so. In particular, according to common general knowledge as illustrated by D4a/D4b/D4c, the alternative wherein the pressure responsive governor acts on the unloading mechanism of the compressor was generally accepted in the field of compressed air systems for vehicles at the priority date of the patent in suit.

The board does not accept the respondent's argument that a skilled person would never have thought of combining the two modes presented as traditional alternatives in the patent in suit, in D4a/D4b/D4c and in D5, since the concept of combining an "*unloader mode*" in the sense of the patent in suit and of an energy saving mode, controlled by a pressure responsive governor, wherein the flow of compressed air from the compressor is stopped, was already developed before the priority date of the patent in suit by the authors of D2.

2.6.4 The board thus comes to the conclusion that, starting from the arrangement disclosed in D2, the person skilled in the art and aware of document D1, would arrive at an arrangement falling within the ambit of claim 1 without any inventive skills being involved.

2.6.5 In the course of the proceedings, the respondent invoked further advantages of the arrangements as claimed, i.e. having a compressor which is permanently running upon operation of the arrangement. These alleged further advantages, which are not mentioned in the patent in suit, are, however, inevitably achieved by the obvious arrangements resulting from the combined teachings of D2 and D1. Hence, they cannot alter the assessment of inventive step in the present case.

2.7 The subject-matter of claim 1 is thus not based on an inventive step as required by Articles 52(1) and 56 EPC.

Auxiliary request 1

3. The amendments consisting in the incorporation of additional features, namely that the arrangement is "*to be mounted on a vehicle*" and comprises an air drier "*including an unloader valve*" find a basis in the application as filed; see page 1, lines 26 to 27, page 2, lines 24 to 25, page 3, lines 12 to 13, and page 4, line 3, of the published PCT application WO 98/57730 A.

The amendments thus meet the requirements of Article 123(2) and (3) EPC.

4. The amendments are not of a nature which would make it necessary to adopt a different understanding of the terms of claim 1. As indicated above (see point 1.2), the reference in claim 1 to the "*unloader mode*" already implies that the claimed arrangement comprises an unloader valve as an integral part of the drier. Moreover, the prior art documents relied upon in the above argumentation all relate to arrangements for providing compressed air on board of vehicles. Hence, the argumentation under points 2. to 2.6.5 herein above applies particularly to the latter arrangements.

Consequently, the subject-matter of claim 1 according to the auxiliary request 1 is also not based on an inventive step as required by Articles 52(1) and 56 EPC.

Auxiliary request 2

5. Amendments

5.1 The amendment consisting in the incorporation of the additional feature "*electrically operated*" relating to the switch-over valve finds a basis in the application as filed (see e.g. claim 3 of the published PCT application) and hence meets the requirements of Article 123(2) and (3) EPC.

5.2 The other features additionally incorporated into claim 1, namely "*a thermostat (9) being provided in an electric line (7) to the switch-over valve (6) is located* ***at*** *the air drier (3)*" (emphasis added), have no literal basis in the application as filed. The board notes that the only disclosure concerning the **location**

of a thermostat governing the solenoid of the valve is in Figure 1 and its description on page 4 first paragraph of the application as filed, according to which the thermostat is more specifically contained in a box 8 "***at*** *the* ***underside*** *of the drier*" (emphasis added). The board thus has strong reservations concerning the allowability under Article 123(2) EPC of the introduction of the more general feature "*located* ***at*** *the air drier*" into claim 1.

6. However, even accepting for the sake of argument in the appellant's favour that this amendment were to be allowable based on what the skilled person could directly and unambiguously derive from the application as filed, the subject-matter of claim 1 as amended is still objectionable for lack of inventive step (Articles 52(1) and 56 EPC) for the following reasons.

6.1 The arrangement disclosed in D2 also comprises a switch-over valve 12 which is "*electrically operated*" and the position of which is controlled by a temperature responsive switching device acting as "*thermostat*" in the sense of present claim 1 and being arranged in an electric line to the switch-over valve. Hence these additional features cannot render the claimed subject-matter inventive.

6.2 Moreover, based on mere engineering routine, the skilled person would arrange the thermostat at a location which is such that the problems associated with operation at low ambient temperatures are effectively overcome. The most sensible possibility at the hand of the skilled person for safely keeping the compressed air conduit to the drier/pressure regulator

from freezing along its entire length is to arrange the thermostat towards the end of the conduit remote from the compressor, i.e. close to or **at** the air drier, for instance at the underside of the drier.

6.3 Consequently, the subject-matter of claim 1 according to the auxiliary request 2 is also not based on an inventive step as required by Articles 52(1) and 56 EPC.

Auxiliary request 3

7. The amended claim 1 according to this request incorporates all the features added to claim 1 according to both the first and the second auxiliary requests. Consequently, the findings under points 3. and 5. herein above concerning the allowability of the various amendments under Article 123(2) and (3) EPC apply mutatis mutandis to present claim 1. For the reasons already indicated under point 5.2, the board has strong reservations concerning the allowability under Article 123(2) EPC of the incorporation into claim 1 of the feature "*located at the drier*" relating to the thermostat.

8. However, even accepting again for the sake of argument in the appellant's favour that this amendment were to be allowable based on what the skilled person could directly and unambiguously derive from the application as filed, the subject-matter of claim 1 as amended is still objectionable for lack of inventive step (Articles 52(1) and 56 EPC) for the following reasons.

8.1 The features additionally incorporated into present claim 1 are either known from D2 (see points 4. and 6.1

herein above) or they represent design options resulting from routine engineering considerations involving no inventive skills (see point 6.2 herein above).

8.2 Consequently, the subject-matter of claim 1 according to the auxiliary request 3 is also not based on an inventive step as required by Articles 52(1) and 56 EPC.

9. None of the respondent's requests can thus be allowed.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The registrar The chairman

C. Vodz G. Raths