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D E C I S I O N
of 25 January 2001

Case Number: T 0081/00 - 3.2.4

Application Number: 93913422.7

Publication Number: 0647114

IPC: A47L 9/16

Language of the proceedings: EN

Title of invention:
Cyclonic vacuum cleaner

Patentee:
NOTETRY LIMITED

Opponent:
HOOVER LIMITED

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - claims of second auxiliary request - yes"

Decisions cited:
-

Catchword:
-



Case Number: T 0081/00 - 3.2.4

D E C I S I O N
of the Technical Board of Appeal 3.2.4
of 25 January 2001

Appellant: HOOVER LIMITED
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Respondent: NOTETRY LIMITED
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Decision under appeal: Interlocutory decision of the Opposition Division
of the European Patent Office posted 23 November
1999 concerning maintenance of European patent
No. 0 647 114 in amended form.

Composition of the Board:

Chairman: C. A. J. Andries
Members: M. G. Hatherly
C. Holtz

Summary of Facts and Submissions

- I. The opposition division's interlocutory decision that the amended European patent No. 0 647 114 met the requirements of the EPC was posted on 23 November 1999.

On 21 January 2000 the appellant (opponent) filed an appeal. The appeal fee was paid on 19 January 2000 and the statement of grounds filed on 3 April 2000.

- II. The main request of the respondent (patentee) in the appeal proceedings is for dismissal of the appeal and therefore corresponds to the amended version of the patent held by the opposition division to meet the requirements of the EPC. This version includes the following independent claims:

"1. A vacuum cleaner comprising a dirty air inlet (12,14) communicating with a clean air outlet by means of an airflow path, a cyclone (18) being arranged in the airflow path such that, in use, dust-laden air flowing along the airflow path from the dirty air inlet (12,14) to the clean air outlet passes through the cyclone (18), characterised in that at least one bleed valve (20) is provided, downstream of the dirty air inlet (12,14), adapted to introduce bled air into the airflow path to combine with the dust-laden air and to maintain the flow rate of the dust-laden air within the cyclone (18), the or each bleed valve (20) being operable when, in use, either the pressure of the air flowing along the airflow path falls to or below a predetermined level or the amount of particulates in the air at or adjacent the clean air outlet exceeds a predetermined level."

"17. A method of operating a cyclonic vacuum cleaner having first and second cyclones (16,18) arranged in series, comprising the steps of:-

- (a) admitting dirty air into the first cyclone (16);
- (b) partially cleaning the dirty air in the first cyclone (16) to produce partially filtered air;
- (c) conducting the partially filtered air from the first cyclone (16) to the second cyclone (18);
- (d) further cleaning the partially filtered air in the second cyclone (18) to produce further cleaned air; and
- (e) exhausting the further cleaned air from the second cyclone (18),

characterised in that bled air is introduced to and combined with the partially filtered air in order to maintain the rate of the airflow within the second cyclone (18)."

III. Claim 1 of the respondent's first auxiliary request (filed on 18 January 2001 as the first auxiliary request) is essentially the same as claim 1 of the main request except that the second alternative at the end of the latter, namely "or the amount of particulates in the air at or adjacent the clean air outlet exceeds a predetermined level", is deleted.

Claim 17 of the first auxiliary request is the same as claim 17 of the main request except that the characterising portion reads:

"characterised in that, bled air is introduced to and combined with the partially filtered air before the entry thereof into the second cyclone (18) in order to maintain the rate of the airflow within the second cyclone (18)."

IV. Claim 1 of the respondent's second auxiliary request (filed in the oral proceedings on 25 January 2001) reads:

"1. A vacuum cleaner comprising a dirty air inlet (12,14) communicating with a clean air outlet by means of an airflow path, a cyclone (18) being arranged in the airflow path such that, in use, dust-laden air flowing along the airflow path from the dirty air inlet (12,14) to the clean air outlet passes through the cyclone (18), characterised in that at least one bleed valve (20) is provided, downstream of the dirty air inlet (12,14) and upstream of the cyclone (18), which is adapted to introduce bled air into the airflow path to combine with the dust-laden air and to maintain the flow rate of the dust-laden air within the cyclone (18), the or each bleed valve (20) being operable when, in use, either the pressure of the air flowing along the airflow path falls to or below a predetermined level or the amount of particulates in the air at or adjacent the clean air outlet exceeds a predetermined level."

Claim 17 of the second auxiliary request adds the words "and for reducing particulates in the further cleaned air" at the end of claim 17 of the first auxiliary request.

V. The following documents played a role in the appeal

proceedings:

D1: DE-A-1 407 995

D2: EP-A-0 042 723

D3: US-A-4 853 008

D4: DE-A-2 911 255

D5: Patent Abstracts of Japan No. 08038398 A

D6: EP-A-0 347 223

D7: EP-A-0 443 845

D8: EP-A-0 371 632

D9: EP-A-0 327 936

D10: DE-A-1 503 601

VI. The appellant and the respondent attended oral proceedings on 25 January 2001.

In the appeal proceedings the appellant argued that the subject-matter of all claims on file lacked novelty or inventive step having regard to the above cited prior art.

The respondent countered the appellant's arguments.

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

The respondent requests that the appeal be dismissed, alternatively that the decision under appeal be set aside and that the patent be maintained on the basis of either the first auxiliary request filed on 18 January 2001, the second auxiliary request filed in the oral proceedings on 25 January 2001, or the third auxiliary request filed as the second auxiliary request with letter of 31 July 2000, and columns 1 to 9 of the description as filed on 25 January 2001 and Figures 1a, 1b, 2 to 6 as granted.

Reasons for the Decision

1. The appeal is admissible.
2. *Amendments - claim 1 of the main request*
 - 2.1 A minor and plainly unobjectionable difference of claim 1 of the main request over the granted claim 1 is that the "air flowing along the airflow path from the dirty air inlet (12,14) to the clean air outlet" is specified to be dust-laden air.
 - 2.2 In the granted claim 1 the bleed valve is "for introducing bled air into the cyclone (18) to maintain the air flow therein". This covers the entry of bled air either upstream of the cyclone or directly into the cyclone as does claim 1 of the main request where the bleed valve is "adapted to introduce bled air into the airflow path to combine with the dust-laden air and to maintain the flow rate of the dust-laden air within the cyclone (18)". The board does not see any objection under Article 123 EPC.

2.3 Thus the amendments made to arrive at claim 1 of the main request are unobjectionable under Article 123(2) EPC and, since they do not broaden the scope of the granted claim 1, they are unobjectionable under Article 123(3) EPC as well.

3. *Novelty and inventive step - claim 1 of the main request*

3.1 Figures 3 and 4 of D10 show a device for creating a rotating flow which comprises a flow chamber 1 with a suction channel 3 and a central outlet 2. Since page 2, line 1 refers to household devices and page 2, lines 14 and 15 refer to the air sucked in having a relatively high proportion of foreign substances, the board finds it most likely that the device is used in a vacuum cleaner. Nevertheless this is not explicitly disclosed so the board finds that the subject-matter of claim 1 of the main request is not known from D10.

3.2 However as stated above the board considers that the skilled person would assume that the flow chamber of D10 would be part of a vacuum cleaner. This is supported by the reference in line 1 of page 2 of D10 to household devices, by the business activities of the company filing the patent application D10, and by the similarity between the devices of D10 and the vacuum cleaner of the slightly earlier D1 from the same applicant.

3.3 The resultant vacuum cleaner of D10 would (implicitly) comprise a dirty air inlet (e.g. the nozzle applied to the surface to be cleaned and connected directly or indirectly to the suction channel 3) and a clean air outlet (connected directly or indirectly to the central

- outlet 2). The dirty air inlet would communicate with the clean air outlet by means of an airflow path (comprising the tubing 2 and 3 and the path within the flow chamber 1).
- 3.4 A cyclone is arranged in this airflow path (the cyclone is in the flow chamber 1) such that, in use, dust-laden air flowing along the airflow path from the dirty air inlet to the clean air outlet passes through the cyclone.
- 3.5 Page 2, lines 14 to 21 of D10 state that, if the air sucked in has a high proportion of foreign substances, there is a danger that the rotating flow cannot build up. To enable an unobjectionable rotating flow also in these conditions, one or more auxiliary channels are provided next to the suction channel to provide extra air. Page 2, line 24 to page 3, line 5 adds that a valve reacting to a subpressure in the flow chamber can be used to open the flow cross section of the respective auxiliary channel when the subpressure in the flow chamber exceeds a preset value. Similar statements are made in the paragraph bridging pages 3 and 4 describing Figures 3 and 4. On Figures 3 and 4 the auxiliary channels are numbered 4 and the valves 5.
- 3.6 Thus at least one bleed valve 5 is provided, downstream of the dirty air inlet (i.e. the nozzle that is connected directly or indirectly to the suction channel 3), adapted to introduce bled air into the flow chamber 1 (i.e. into the airflow path to combine with the dust-laden air). The board cannot see that the purpose of this bled air can be other than to maintain the flow rate of the dust-laden air within the cyclone. The or each bleed valve 5 is operable when, in use, the

subpressure in the flow chamber exceeds a preset value. This condition is the same condition as the pressure of the air flowing along the airflow path falling below a predetermined level.

- 3.7 The respondent argues that D10 does not address the problem set out in the patent.

The patent refers in column 1, lines 25 to 29 to a reduction of the airflow along the airflow path if the dirty air inlet is blocked to a greater or lesser extent. In D10 blocking the air inlet would reduce the pressure in the flow chamber 1 and cause the bleed valves 5 to open and admit bleed air into the flow chamber. This would act to maintain the airflow rate in the cyclone. The board sees no difference between the operation of the device claimed in claim 1 of the main request and that of D10 in this respect.

The patent refers in column 2, lines 13 to 17 to a problem if the vacuum cleaner picks up a particularly heavy concentration of fine particulate matter. This is the situation dealt with on page 2, lines 14 to 21 of D10, only lacking a statement that the particulate matter is fine.

The respondent argues that D10 does not indicate why the valves are responsive to negative pressure in the flow chamber and what the negative pressure needs to be. The board points out that the reason for the valves being responsive to negative pressure is clear - so that they open when a preset negative pressure occurs in the flow chamber. Moreover neither does the claim specify the value of necessary negative pressure. The condition in the claim that the bleed valves open if

"the pressure of the air flowing along the airflow path falls to or below a predetermined level" is fulfilled in D10 (see page 3, lines 1 to 5).

3.8 Thus the board can see no difference between what claim 1 of the main request defines and the disclosure of D10 except that the latter does not explicitly specify a vacuum cleaner. Accordingly the board concludes that the claimed subject-matter lacks inventive step (Articles 52(1) and 56 EPC).

4. *The main request*

Since claim 1 of the main request is not patentable, the main request taken as a whole must fail.

5. *Claim 1 of the first auxiliary request*

5.1 Claim 1 of the first auxiliary request is essentially the same as claim 1 of the main request except that the second alternative at the end of the latter, namely "or the amount of particulates in the air at or adjacent the clean air outlet exceeds a predetermined level", is deleted.

5.2 There is no objection under Article 123(2) EPC to deleting one of the originally disclosed alternatives. The resulting claim is more restricted than claim 1 as granted so there is no objection under Article 123(3) EPC either. Also it is more restricted than claim 1 of the main request maintained by the opposition division so that the amendment could not put the appellant (opponent) in a worse position than if he had not appealed.

5.3 However the objections made in the above section 3 against claim 1 of the main request apply fully to claim 1 of the first auxiliary request since the alternative retained in the latter claim is that disclosed by D10, see the above sections 3.4 and 3.5.

5.4 Therefore the subject-matter of claim 1 of the first auxiliary request lacks inventive step (Articles 52(1) and 56 EPC).

6. *The first auxiliary request*

Since claim 1 of the first auxiliary request is not patentable, the first auxiliary request taken as a whole must fail.

7. *The second auxiliary request - amendments*

7.1 The above section 2.3 explains why the amendments made to arrive at claim 1 of the main request are unobjectionable under Article 123 EPC. The only substantive change made to claim 1 of the main request to yield claim 1 of the second auxiliary request is to add that the at least one bleed valve 20 is provided "upstream of the cyclone (18)".

This is one of the alternatives set out in column 2, lines 49 to 53 of the granted description (page 5, lines 3 to 7 of the originally filed description), to introduce air either upstream of the cyclone or directly into the cyclone. If there are two cyclones then the granted description explains in column 5, lines 38 to 47 (page 11, lines 8 to 17 of the originally filed description) that the bleed valves are located upstream of the entrance to the second (i.e.

downstream) cyclone. The invention in fact also concerns vacuum cleaners with more than two cyclones and a bleed valve or valves can be used to maintain the airflow in any one or more of the cyclones (see the last paragraph of the description both as originally filed and as granted).

Thus the findings in the above section 5.2 apply fully also to claim 1 of the second auxiliary request.

7.2 The claims 2 to 16 dependent on claim 1 correspond to the granted dependent claims 2 to 16.

7.3 In the independent method claim 17 as granted the "bled air is admitted, in addition to the partially filtered air, into the second cyclone (18)" whereas in claim 17 of the second auxiliary request the "bled air is introduced to and combined with the partially filtered air before the entry thereof into the second cyclone (18) in order to maintain the rate of the airflow within the second cyclone (18)".

Introducing air between two cyclones is disclosed in e.g. lines 55 and 56 of column 2, lines 38 to 41 of column 5, and claim 3, all in the granted patent (corresponding to lines 9 and 10 of page 5, lines 8 to 11 of page 11 and claim 3 in the originally filed application).

Maintenance of the rate of the airflow is disclosed in lines 46 and 47 of column 2 of the granted description (corresponding to the sentence bridging pages 4 and 5 of the originally filed description).

There is thus no objection under Article 123(2) EPC to

claim 17 of the second auxiliary request. The claim is more restricted than claim 17 as granted so there is no objection under Article 123(3) EPC and is more restricted than claim 17 of the main request maintained by the opposition division.

7.4 The granted description has been amended to bring it into line with the claims and to acknowledge newly cited prior art. The drawings are as granted.

7.5 Thus the version of the patent according to the second auxiliary request does not contravene Article 123 EPC.

8. *Claim 1 of the second auxiliary request - novelty*

Claim 1 of the second auxiliary request specifies that the at least one bleed valve 20 is provided "upstream of the cyclone (18)". This means that the dust-laden air and bled air meet each other upstream of the cyclone and premix prior to entry into the cyclone.

This is not known from D10 where the dust-laden air and bled air enter the flow chamber 1 through suction channel 3 and auxiliary channels 4 respectively i.e. the flows first meet each other in the flow chamber.

Neither is it known from D1 where the second pipe 10 leads air from the underpressure valve 11 directly into the chamber 1 (see Figure 1 and page 3, lines 9 to 12).

Nor does any of the other prior art documents on file disclose the subject-matter of this claim which is therefore novel in the meaning of Article 52(1) and 54 EPC.

9. *Claim 1 of the second auxiliary request - closest prior art, problem and solution*

The board sees the closest prior art device to be that disclosed by D10 and sees the problem arising therefrom as being to increase the efficiency of separation of dust when the bleed valves are opened to maintain the flow-rate of the dust-laden air within the cyclone.

Claim 1 of the second auxiliary request specifies that the at least one bleed valve 20 is provided "upstream of the cyclone (18)". This means that the dust-laden air and bled air meet each other upstream of the cyclone and premix prior to entry into the cyclone. This is advantageous compared with the arrangement in D10 where a portion of the volume of the flow chamber is used up for combining the dust-laden air and bled air.

Thus the board finds that the problem arising from the device of D10 is solved by the features of claim 1 of the second auxiliary request and in particular by the siting of the at least one bleed valve.

10. *Claim 1 of the second auxiliary request - inventive step*

10.1 The paragraph bridging pages 3 and 4 of the description of D10 states that the suction channel 3 and the auxiliary channels 4 are arranged next to each other on the end face of the flow chamber 1. This is what is shown in Figures 3 and 4 and what is claimed in claims 2 and 3. There is no hint in D10 towards combining the dust-laden air and bled air prior to entry into the flow chamber and indeed the drafter of

D10 presumably felt that an optimal design had been arrived at since the final paragraph of the description of page 4 states that the whole height of the chamber is used for developing the rotating flow.

- 10.2 Figure 1 of D1 shows the suction channel 5 and the auxiliary channel (from the underpressure valve 11) entering separately into the chamber 1 (see page 3, lines 9 to 12). Also in D1 there is no hint towards combining the dust-laden air and bled air prior to entry into the flow chamber.

Therefore the skilled person in the art wishing to decrease the overall height of the cyclone (which is the object of the invention with which D10 is concerned) apparently did not recognise that it would be possible to decrease the height still further by locating the bleed valve upstream of the cyclone. It therefore cannot be seen that this modification would have been obvious. Indeed, a part of the height of the D10 cyclone has to be used to mix and create, from the different entering fluid flows, the appropriate vortex fluid flow. By mixing beforehand, as provided for by claim 1 of the second auxiliary request, a proper vortex flow can be obtained directly, without interference with other fluid flows, so that the whole height can be used only for the cyclonic effect.

- 10.3 The board also cannot see any such hint in any of the other cited prior art documents.

D2 and D3 each disclose a two cyclone vacuum cleaner but neither contains anything of relevance for the present invention. The reference on page 7, lines 11 to 16 of D2 to throttle the entry pipe to the cyclone to

increase separation efficiency teaches away from bleeding air into the cyclone.

D4 and D6 to D9 do not concern cyclonic cleaners and would not help the skilled person to design a cyclonic vacuum cleaner where air is bled in upstream of the cyclone.

D5 was published on 13 February 1996 and so is not prior art.

10.4 Thus the board concludes that the prior art documents on file, taken singly or in any combination, would not lead the skilled person to the subject-matter of claim 1 of the second auxiliary request which thus involves an inventive step as required by Articles 52(1) and 56 EPC.

11. *Claim 17 of the second auxiliary request*

This method claim includes the step of introducing and combining bled air with the partially filtered air before the entry thereof into the second cyclone 18 which corresponds to the feature in claim 1 of the second auxiliary request of the at least one bleed valve 20 being provided upstream of the cyclone 18. The discussion of the device claim 1 in the above sections 8 to 10 applies analogously to the method claim 17 which therefore involves the necessary inventive step.

12. The patent may therefore be maintained amended, based on independent claims 1 and 17 of the second auxiliary request, claims 2 to 16 dependent on claim 1, the amended description and the drawings as granted.

13. Accordingly it is unnecessary to examine the respondent's third auxiliary request.
14. The appellant provided no reasons for the request on page 19 of the statement of grounds of appeal for a refund of the appeal fee and indeed withdrew this request during the oral proceedings.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent in the following version:

Claims: claims 1 to 17 of the second auxiliary request, filed on 25 January 2001,

Description: columns 1 to 9 filed on 25 January 2001,

Drawings: Figures 1a, 1b, 2 to 6 as granted.

The Registrar:

The Chairman:

G. Magouliotis

C. Andries