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Datasheet for the decision of 24 June 2021

Case Number: T 1077/18 - 3.2.03

Application Number: 05743350.0

Publication Number: 1751476

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Language of the proceedings: EN

Title of invention:
COMPRESSOR LUBRICATION

Applicant:
Carrier Corporation

Headword:

Relevant legal provisions:
EPC Art. 123(2), 84, 54, 56

Keyword:

Decisions cited:

Catchword:

Europäisches Patentamt
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Case Number: T 1077/18 - 3.2.03

D E C I S I O N
of Technical Board of Appeal 3.2.03
of 24 June 2021

Appellant: (Applicant)	Carrier Corporation One Carrier Place Farmington, CT 06034-4015 (US)
Representative:	Dehns St. Bride's House 10 Salisbury Square London EC4Y 8JD (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 22 November 2017 refusing European patent application No. 05743350.0 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	C. Herberhold
Members:	R. Baltanás y Jorge
	N. Obrovski

Summary of Facts and Submissions

I. European patent application No. 05 743 350.0 relates to a system comprising a screw-type compressor.

II. The appeal lies from the examining division's decision posted on 22 November 2017 refusing the above-mentioned European patent application.

The examining division held that the main request, auxiliary requests 1-11 and auxiliary request 14 did not comply with the requirements of Article 123(2) EPC, and that the subject-matter of claim 1 of auxiliary requests 12 and 13 did not involve an inventive step (Article 56 EPC) with regard to the combination of D5 and D1.

III. The applicant (hereinafter: the "appellant") filed an appeal against the above-mentioned decision in the prescribed form and within the prescribed time limit.

IV. The Board issued a communication under Article 15(1) RPBA 2020 dated 12 November 2020 and a further communication dated 26 April 2021. On 14 June 2021, a telephone conference between the rapporteur and the appellant's representative took place.

V. With letters dated 8 June 2021 and 23 June 2021, the appellant withdrew all previous requests on file and submitted a "new Main request" and an amended description.

VI. New Main request

The appellant requested that the decision under appeal be set aside and that a patent be granted on the following basis:

- Claims 1 and 2 corresponding to the "new main request" filed with letter of 8 June 2021.

- Description
  - pages 1 to 3, 5 and 11 filed with letter of 8 June 2021
  - pages 6 and 7 as published
  - pages 8, 9 and 10 filed with letter of 23 June 2021

- Figures 1 to 3 as published.

VII. Claim 1 according to the new main request reads (amendments compared with claim 1 as filed are shown in bold):

"*A system* ***(80)*** *comprising:*

a ***screw-type*** *compressor* ***(20)*** *having a compression path between a suction port located to receive a working fluid and a discharge port located to discharge the working fluid;*

a condenser (82) receiving and condensing working fluid compressed by the compressor (20);

an evaporator (84) receiving and evaporating working fluid condensed by the condenser (82) and returning the evaporated working fluid to the compressor (20); *and*

a throttle valve (85) arranged between the condenser and the evaporator (84); characterised by further comprising

means ***adapted to control a supplemental*** *flow of* **[~~at least one of additional~~]** *working fluid* **[~~and lubricant~~]** ***to the compressor (20)*** *responsive to changes in at least one pressure parameter;*

said parameter comprising a difference between the pressure of working fluid at an outlet from the condenser (82) and the pressure at the location (280) of introduction of the supplemental flow of working fluid to the compressor (20), wherein the location (280) of introduction is in the last third of the compression process; and said means comprises a pressure-actuated mechanical check valve (152) arranged between the outlet of the condenser (82) and the location (280)."

Dependent claim 2 concerns a preferred embodiment of the system from claim 1.

VIII. The following documents are relevant for this decision:

D1: US 4,230,470 A
D4: EP 1 400 765 A2
D5: US 3,568,466 A

IX. The appellant's arguments can be summarised as follows.

The appellant agreed with the examining division's conclusions concerning the compliance of the new main request with the provisions of Article 123(2) EPC.

With regard to inventive step, document D1 does not disclose the admission of supplemental flow into the compressor, but into an accumulator upstream of the same. Moreover, the valve 12 in D1 is not controlled by a pressure difference as defined in claim 1. The problem addressed by the invention, i.e. that of avoiding a potential under-compressed condition which may cause issues with compressor cooling and sealing, was neither recognised nor suggested in the prior art.

Reasons for the Decision

1. Article 123(2) EPC

The Board agrees with the examining division that the claims of the ne main request (corresponding to auxiliary request 12 underlying the impugned decision, see reasons 10.1) comply with the requirements of Article 123(2) EPC.

In particular, the following basis can be found for the features added to claim 1:

"screw-type compressor": paragraph [0001] of the originally filed description;

"a condenser (82) receiving ... returning the evaporated working fluid to the compressor (20)": originally filed claim 2;

"*a throttle valve (85) arranged between the condenser and the evaporator (84)*": lines 4 and 5 of paragraph [0023] of the description and figure 2;

"*means adapted to control a supplemental flow of working fluid to the compressor (20)*": originally filed claim 1 plus figure 2 and paragraphs [0005] or [0042] of the description;

"*said parameter comprising a difference between the pressure of working fluid at an outlet from the condenser (82) and the pressure at the location (280) of introduction of the supplemental flow of working fluid to the compressor (20)*": originally filed claim 3 and figure 2;

"*wherein the location (280) of introduction is in the last third of the compression process*": lines 5 to 9 of paragraph [0034] of the description;

"*said means comprises a pressure-actuated mechanical check valve (152) arranged between the outlet of the condenser (82) and the location (280)*": claim 4 as filed, figure 2 and lines 1 to 4 of paragraph [0042] of the description.

Dependent claim 2 has a basis in lines 5 to 9 of paragraph [0034] of the description.

2. Article 84 EPC

The examining division has not raised an objection concerning any possible lack of clarity. The Board does not see any problem in this respect either.

3. Article 54 EPC

The examining division has not objected to the novelty of claim 1. The Board agrees that none of the prior-art

documents considered discloses the claimed subject-matter.

4. Article 56 EPC

4.1 The Board shares the examining division's view that D5 is a suitable starting point for assessing the inventive step of the invention, since it concerns a heat exchanger system comprising means to control a supplemental flow of working fluid into the compressor.

4.2 As pointed out by the examining division and by the appellant, the subject-matter of claim 1 differs from D5 in that the claimed system comprises means adapted to control a supplemental flow of working fluid to the compressor responsive to changes in at least one pressure parameter, said parameter comprising a difference between the pressure of working fluid at an outlet from the condenser and the pressure at the location of introduction of the supplemental flow of working fluid to the compressor.

D5 comprises a control valve 11 in the pipe leading the supplemental flow of working fluid to the compressor 1, but no further details are provided about this control valve or its function.

4.3 The technical effect of the differentiating features is that the supplemental flow of working fluid to the compressor takes place on the basis of the pressure difference between the outlet of the condenser and the location of introduction of the supplemental flow of working fluid into the compressor. The additional fluid cools the working elements to maintain proper interaction of the elements with each other and/or with

the housing to prevent/resist failure (paragraph [0033] of the description as filed).

The objective problem can thus be defined as detecting a situation of danger for the compressor in order for it to react (see originally filed application, first four lines of paragraph [0042] in connection with paragraphs [0032], [0033] and fourth and fifth sentences of paragraph [0036]), as argued by the appellant.

The Board does not agree with the problem as defined by the examining division, which merely identifies the technical effect involved as that of replacing the control valve 11 with the claimed mechanism ("provision of an appropriate control valve"; see point 10.2 of the contested decision), thus ignoring the actual technical effect provided in the application itself as described above.

4.4 Document D5 does not mention anything regarding the function of the control valve 11, and the system is designed to increase the refrigerating effect and to improve the power consumption of the compressor (see column 2, lines 25 to 33). The reader thus understands from D5 that the control valve 11 does not need dynamic regulation, but that it is adjusted by a user as required.

No hint can thus be found in D5 which would motivate the skilled person to look for a way of managing the control valve 11 in order to respond to a situation of danger for the compressor.

4.5 Moreover, even if the skilled person were motivated to look for a solution to the problem posed, they would

not be able to find the claimed solution in document D1, as stated by the examining division, since this document merely discloses the use of a relief valve 12 at the exit of the condenser 2. This relief valve 12 opens when the pressure at the outlet of the condenser overcomes a certain threshold (see column 6, lines 32 to 40); however, it does not direct the working fluid into a location of introduction in the last third of the compression process. The pressure parameter used in the valve from D1 thus does not comprise a difference between the pressure of working fluid at an outlet from the condenser and the pressure at the location of introduction of the supplemental flow of working fluid to the compressor in the last third of the compression process.

There is thus no reason for the skilled person to replace the valve disclosed in D5 with the valve of D1. If at all, the skilled person would additionally insert the valve from D1 into the circuit from D5, but in the same context in which the valve is used in document D1.

The Board cannot see a basis for the assertion made by the examining division that in D1 "*a pressure-actuated mechanical check valve was arranged between the outlet of the condenser and the location and used for the same purpose*" (see first sentence of the penultimate paragraph of point 10.2 of the contested decision). No specific passage of D1 has been cited in support of this statement.

4.6 D4 is also a plausible starting point for assessing inventive step since it discloses a flow of supplemental working fluid to the compressor 11 by means of a throttle valve 15 (see bypass flow passage II, figures 1 and 4, and also paragraphs [0022] to

[0024]). Adjustment of the throttle valve 15 is disclosed on the basis of working fluid temperature at the outlet of compressor 11 (temperature sensor 21; see paragraphs [0031] and [0032]).

However, the result of the inventive step analysis departing from D4 is the same as when departing from D5, since there is no reason to modify the control of throttle valve 15 on the basis of the claimed pressure parameter. Furthermore, D4 does not disclose the introduction of the supplemental flow of working fluid to the compressor at a location of introduction in the last third of the compression process.

4.7 The subject-matter of claim 1 thus involves an inventive step.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the examining division with the order to grant a patent in the following version:

   - Claims 1 and 2 of the "new main request" filed with letter of 8 June 2021.

   - Description
     - pages 1 to 3, 5 and 11 filed with letter of 8 June 2021
     - pages 6 and 7 as published
     - pages 8, 9 and 10 filed with letter of 23 June 2021

   - Figures 1-3 as published.

The Registrar: The Chairman:

C. Spira C. Herberhold

Decision electronically authenticated