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Case Number: T 1939/18 - 3.2.03

Application Number: 12179748.4

Publication Number: 2557282

IPC: F23M20/00, F23R3/00, F02C7/24

Language of the proceedings: EN

Title of invention:
Acoustic Helmholtz Dampener For Use In Gas Turbine Engine

Patent Proprietor:
General Electric Company

Opponent:
Ansaldo Energia Switzerland AG

Headword:

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - (yes) - ex post facto analysis

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Catchword:

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Case Number: T 1939/18 - 3.2.03

D E C I S I O N
of Technical Board of Appeal 3.2.03
of 26 April 2022

Appellant: (Opponent)	Ansaldo Energia Switzerland AG Römerstrasse 36 5401 Baden (CH)
Representative:	Bernotti, Andrea Studio Torta S.p.A. Via Viotti, 9 10121 Torino (IT)
Respondent: (Patent Proprietor)	General Electric Company 1 River Road Schenectady, NY 12345 (US)
Representative:	Grünecker Patent- und Rechtsanwälte PartG mbB Leopoldstraße 4 80802 München (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 28 May 2018 concerning maintenance of the European Patent No. 2557282 in amended form.**

Composition of the Board:

Chairman	G. Patton
Members:	R. Baltanás y Jorge
	D. Prietzel-Funk

Summary of Facts and Submissions

I. European patent No. 2 557 282 relates to an acoustic dampener.

II. An opposition was filed against the patent based on Article 100(c) EPC and on Article 100(a) EPC together with Articles 54 and 56 EPC.

III. The opposition division decided that no ground of opposition prejudiced the maintenance of the patent in amended form according to the then auxiliary request 1.

The opponent (hereinafter: the "appellant") filed an appeal against the above-mentioned interlocutory decision by the opposition division.

In a communication pursuant to Article 15(1) of the Rules of Procedure of the Boards of Appeal (RPBA 2020), the Board indicated its preliminary opinion on the case.

Oral proceedings were held on 26 April 2022.

IV. Requests

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

The respondent (patent proprietor) made auxiliary request II (2nd auxiliary request filed on 2 January 2018) its main request and withdrew all other requests on file. It then requested that the patent be

maintained in amended form according to claims 1 to 13 of the main request (auxiliary request II).

V. Claim 1 of the main request, including the numbering of its features as adopted by the Board, reads as follows:

M1 *An acoustic dampener (300), for a gas turbine engine (10), comprising:*

M2 *a cylindrical body wall (320) defining a volume;*

M3 *a first cavity (308) having a hole (312) for allowing fluid communication between the first cavity (308) and a first fluid source;*

M3' *a first wall (302) for separating the first fluid source from a second fluid source, said first wall (302) having the hole (312) for allowing fluid communication between the first fluid source and the first cavity (308) of the acoustic dampener (300);*

M4 *a second cavity (310);*

M4' *a second wall (306) for separating the second cavity (310) of the acoustic dampener (300) from the second fluid source;*

M5 *and an orifice plate (304) for separating the first cavity (308) of the acoustic dampener (300) from the second cavity (310) of the acoustic dampener (300),*

M6 *said orifice plate (304) having a hole (314) for allowing fluid communication between the first cavity (308) of the acoustic dampener (300) and the second cavity (310) of the acoustic dampener (300);*

M6' *wherein the orifice plate (304), the first wall (302) and the cylindrical body wall (320) define the first cavity (308);*

M6" *wherein the orifice plate (304), the second wall (306) and the cylindrical body wall (320) define the second cavity (310);*

M7 *wherein the cylindrical body wall (320) comprises a plurality of holes (316) for allowing fluid communication between the second cavity (310) and the second fluid source,*

M8 *the plurality of holes (316) for allowing fluid communication between the second cavity (310) and the second fluid source each having the same diameter*

M9 *and located between the orifice plate (304) and the second wall (306).*

The main request also comprises an independent method claim, claim 9, against which no objection has been raised by the appellant.

VI. State of the art

The following documents have been cited, both in the statement setting out the grounds of appeal and during the opposition proceedings, and they are each relevant for this decision:

D2: US 2011/0139541 A1
D3: US 2005/0034918 A1

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

The invention in claim 1 was obvious with regard to the embodiment in Figures 8A and 8B of D3 alone or in combination with D2.

The only distinguishing features of claim 1 with respect to the embodiment in D3 in question were M2

(cylindrical body wall) and M7 (cylindrical body wall comprising a plurality of holes). These features did not have a specific function in the operation of the acoustic dampener, and therefore no technical effect could be ascertained for them. M2 and M7 instead addressed alternatives for different design aspects of the acoustic dampener, namely the external shape and the location of the holes allowing fluid communication between the upper cavity (108) and the surrounding environment.

For the skilled person, providing a cylindrical body wall (feature M2) instead of the external rectangular wall (22, 106) of D3 would have been a matter of making an arbitrary choice from equally valid alternatives.

The same was true for the location of the holes (104) on top of the acoustic dampener of D3, which could have alternatively been arranged on the side wall by the skilled person without exercising any inventive skill, who would thus have arrived at the invention in an obvious way if a cylindrical side wall had been provided as explained above.

The skilled person could also have been motivated by document D2 when making the necessary modifications, since this document disclosed an acoustic dampener with a cylindrical body wall (see Figures 1 or 5) comprising a hole (15) for allowing fluid flow as in D3.

VIII. The respondent's arguments can be summarised as follows.

D3 did not contain any pointer for the skilled person to modify the shape of the rectangular acoustic

dampener in Figures 8A and 8B or to change the location of the holes (104).

The differentiating features had an effect on the acoustics of the dampener. The technical effect of providing the holes on the side wall, i.e. radially oriented instead of axially as in D3, was that the fluid streams were mixed, thus creating eddies which can dissipate energy by the vortex effect when dampening took place. The technical effect of adopting a cylindrical shape for the side wall was that the mixing of the fluid coming from the radial holes was easier to control. The vortex generation linked to these technical effects was disclosed on page 8, lines 7 to 10, in the version as originally filed (column 6, lines 13 to 17 of the patent specification).

The skilled person would not have considered document D2 when starting from D3, since it concerned a completely different system working on an artificial airflow introduced tangentially by a single inlet (15) into a cylindrical chamber to create a swirl in conjunction with a single constriction (12) between the cavities (see Figure 5). This system would not have worked with the multiple holes (20) in the orifice plate (18) in D3 allowing communication between the cavities, and the intended swirl could not have been generated in a rectangular dampener such as that in D3, either. Furthermore, the system in D2 required radial **and** axial flow, and the latter would have been missing if the location of the holes (104) in D3 had been changed to the side wall. Finally, D2 required a single inlet (15), contrary to the requirements of feature M7, and disclosed that if the flow had to be adjusted, this would have been done by varying the size of this inlet (see paragraph [0019] and the last sentence of

paragraph [0043]). D2 and D3 were therefore incompatible solutions.

Moreover, the teaching of D3 led away from changing the location of the holes (104) which provided an axial flow into the dampener, since such an axial flow was necessary for the disclosed impinging of the air on the resonator plate (18) (see the last sentence of paragraph [0048]).

Reasons for the Decision

1. Main request - inventive step, Article 56 EPC

1.1 Disclosure of D3

The Board agrees with the appellant in that the embodiment shown in Figures 8A and 8B of D3 can be selected as the closest prior art for the subject-matter of claim 1 since it concerns an acoustic dampener ("box 100 (...) attached on top of the resonator 14"; see paragraph [0046]).

Figures 8A and 8B disclose an acoustic dampener (110, 14) for a gas turbine engine (see paragraph [0001]), comprising:

a first cavity (16) having a hole (26; see Figures 4, 6A and 8A) for allowing fluid communication between the first cavity (16) and a first fluid source (interior of the combustor; see, for instance, Figure 2);

a first wall (24) for separating the first fluid source (interior of the combustor) from a second fluid source (exterior of the combustor; again, see Figure 2), said

first wall (24) having the hole (26) for allowing fluid communication between the first fluid source and the first cavity (16) of the acoustic dampener;

a second cavity (108);

a second wall (102) for separating the second cavity (108) of the acoustic dampener from the second fluid source;

and an orifice plate (18) for separating the first cavity (16) of the acoustic dampener from the second cavity (108) of the acoustic dampener, said orifice plate (18) having a hole (20) for allowing fluid communication between the first cavity (16) of the acoustic dampener and the second cavity (108) of the acoustic dampener;

wherein the orifice plate (18), the first wall (24) and a periphery wall (22, 106) define the first cavity (16);

wherein the orifice plate (18), the second wall (102) and the periphery wall (22, 106) define the second cavity (108);

wherein the second wall (102) comprises a plurality of holes (104) for allowing fluid communication between the second cavity (108) and the second fluid source.

This is not disputed by the parties.

1.2 Differentiating features M2 and M7

The parties also do not contest the fact that features M2 (cylindrical body wall) and M7 (cylindrical body

wall comprising a plurality of holes for allowing fluid communication between the second cavity and the second fluid source) of claim 1 are not disclosed in D3. It is noted that feature M9 (the plurality of holes being located between the orifice plate and the second wall) would be equivalent to feature M7 in the context of D3, since it would be automatically present if feature M7 were implemented in such a device.

The appellant did not provide arguments against the technical effect of the differentiating features M2 and M7 put forward by the respondent, but merely stated that no technical effect was provided by these features.

The Board considers that the skilled person can derive the alleged technical effect from the information provided in the patent specification regarding creating vortices by virtue of the effusion holes and their effect in the absorption of acoustic energy (column 6, lines 13 to 17), in the light of the common general knowledge concerning the effects of a radial flow of air from holes arranged over a circumference in the context of the claimed device.

The differentiating features M2 and M7 thus have the technical effect of creating fluid vortices in a controllable way within the second cavity. Consequently, the objective technical problem addressed by the invention in claim 1 can be defined as that of improving the absorption of acoustic energy.

1.3 Combination with D2

The skilled person would not consider D2 when addressing the objective technical problem starting

from D3 given the completely different nature of both acoustic dampeners, even if D2 addresses the same technical problem (see paragraphs [0007] and [0008]).

The acoustic dampener in D3 concerns a device in which air can flow freely into the resonator from a plurality of openings in a top plate (see Figures 8A and 8B), whereas D2 concerns an acoustic dampener in which air is purposefully injected in a controlled manner into a particular cavity of the disclosed resonator in order to influence the acoustic impedance (see paragraph [0043]). The device in D3 thus has a much simpler construction and operation, and the skilled person therefore would not expect that any teaching of the much more complex resonator in D2 could be extrapolated to it in a straightforward manner.

The skilled person would recognise that the acoustic dampener in D2 is based on the presence of a single constriction (12) between the cavities (11, 16), such that when air is purposefully injected axially (inlet 14) and radially (inlet 15), a swirl is created which determines the acoustic impedance in the constriction (12) (see paragraph [0043], first four sentences). Given the presence of multiple holes (20) in the resonator plate (18) in D3, such a solution could not be implemented in this device, let alone any considerations regarding the source of air (free flow versus purposeful injection) and the number of resulting holes in a hypothetical cylindrical side wall in D3 (D2 is based on the presence of **a single** air inlet 15).

The combination of D3 with D2 thus would not be envisaged by the skilled person and would not lead them to the invention in claim 1 anyway.

1.4 Combination with common general knowledge

Since an objective technical problem can actually be defined in view of the technical effect of the differentiating features (see point 1.2 above), the Board sees no reason to deviate from using the problem-solution approach to assess the inventive step of the invention.

The appellant did not argue how the common general knowledge of the skilled person could contribute to providing the claimed solution when attempting to address a technical problem. In the absence of any such reasons, the Board considers that the combination of D3 with the common general knowledge cannot prove the obviousness of the invention in claim 1.

For the sake of completeness it must be noted that D3 is based on the assumption that the holes (104) in the top plate (102) provide an axial air flow which impinges on the resonator plate (18), and that the invention in D3 addresses the problem of equalising the pressure of this air flow impinging on the resonator plate (18) in order to supply a substantially even pressure distribution to the resonator (see paragraph [0030] and the last sentences of paragraphs [0015] and [0048]). Therefore, the skilled person would not contemplate altering the location of the holes (104) which provide the axial air flow without a strong incentive for it. The suggestion that the skilled person would change the location of the holes (104) from the top plate to a side wall, thus changing the air flow to a radial air flow, as a matter of arbitrary choice is thus not realistic and is tainted by an *ex-*

post facto analysis which could not be envisaged without having knowledge of the claimed invention.

1.5 Conclusion

The subject-matter of claim 1 involves an inventive step with regard to the proposed combinations (Article 56 EPC).

Since independent method claim 9 concerns a method of making an acoustic dampener which basically corresponds to the acoustic dampener defined in claim 1, it follows that the subject-matter of claim 9 also involves an inventive step, at least for the same reasons as explained above. Therefore, the patent is to be maintained in amended form on the basis of the claims according to the main request.

2. Adaptation of the description

The parties are of the opinion that it is not necessary to adapt the description of the patent specification to bring it into line with the amended claims.

The Board agrees with this assessment in the absence of any contradiction between the description and the maintained claims and in view of the definition of the invention provided in paragraphs [0008] to [0010].

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the opposition division with the order to maintain the patent in the following version:

   - description: columns 1 to 6 of the patent specification
   - claims: 1 to 13 according to the main request (2nd auxiliary request submitted with the letter dated 2 January 2018)
   - drawings: 1 to 5 of the patent specification.

The Registrar: The Chairman:

C. Spira G. Patton

Decision electronically authenticated