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Aktenzeichen / Case Number / N^o du recours : T 43/83
Anmeldenummer / Filing No / N^o de la demande : 80 300 723.8
Veröffentlichungs-Nr. / Publication No / N^o de la publication : 0 015 770

Bezeichnung der Erfindung: Stereophonic Sound Synthesizer
Title of invention:
Titre de l'invention :

Klassifikation / Classification / Classement : H04 S 5/00

ENTSCHEIDUNG / DECISION

vom / of / du 11 December 1985

Anmelder / Applicant / Demandeur : RCA Corporation

Patentinhaber / Proprietor of the patent /
Titulaire du brevet :

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence :

EPÜ / EPC / CBE

Art. 56
Inventive Step

Leitsatz / Headnote / Sommaire

Europäisches
Patentamt

Beschwerdekammern

European Patent
Office

Boards of Appeal

Office européen
des brevets

Chambres de recours



Case Number : T 43 /83

D E C I S I O N
of the Technical Board of Appeal
of 11 December 1985

Appellant : RCA Corporation
201 Washington Road
Princeton, New Jersey 08540

Representative : T.I.M. Smith
Norfolk House
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London SW1Y4JR

Decision under appeal : Decision of Examining Division 057 of the European Patent Office dated 22 June 1982 refusing European patent application No 80 300 723.6 pursuant to Article 97(1) EPC

Composition of the Board :

Chairman : G. Korsakoff
Member : P.K.J. van den Berg
Member : F. Benussi

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Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence : "Stereo synthesizer/RCA"

EPÜ / EPC / CBE Art. 56, Art. 114(2), Rule 67, Rule 86

Inventive Step; Documents belatedly submitted; substantial procedural violation; consent of the Examining Division.

Leitsatz / Headnote / Sommaire

1. The Board of Appeal may disregard any submissions received after expiry of the 4 month's period mentioned in Art. 108.
2. Rejection of an European patent application after one communication by the Examining Division does not in principle constitute a substantial procedural violation in the sense of Rule 67, because of rule 86(3).

I. Summary of Facts and Submissions

- I. European patent application No. 80 300 723.6 filed on 07.03.80 (Publication No. 0 015 770) claiming a priority of 09.03.79 (US) was refused by a decision of the Examining Division 057 of the EPO on 22.06.82. That decision was based on Claims 1-13 as originally filed on 07.03.80.
- II. The reason given for the refusal was that the subject-matter of the claims lacked inventive step with regard to the document Journal of the Audio Engineering Society, Vol. 18, No. 2, April 1970, pages 158-160, the section headed "The Stereo Synthesizer" which will be referred to hereinafter as the Orban article.
- III. The Applicant lodged an appeal against this decision on 09.08.82. The appeal fee was paid on the same day. The Statement of Grounds was filed on 18.10.82.

In the Notice of Appeal the Appellant requested :

- a) that the rejection be cancelled and that the grant of a patent on the application be ordered either without or with amendment as the Board of Appeal may deem appropriate on the proposal of the Appellant;
- b) full or partial reimbursement of the appeal fee pursuant to Rule 67 on the ground that the Examining Division was premature in issuing the decision to refuse after only one previous communication to the Applicant.

In the Statement of Grounds the Appellant argued on the one hand that Claim 1 as originally filed did not require amendment so as to present patentable subject-matter (page 7, last sentence of item 12) and on the other hand, possible amendments to this Claim 1 were proposed (items 13-15) in case the Board of Appeal would judge upon the unamended originally filed Claim 1 as being not allowable.

- IV. After receipt of the Statement of Grounds on 18.10.82 a further letter from the Appellant was received on 21.11.83, amongst other things proposing four sets of claims designated A, B, C and D in descending order of preference.
- V. In his communication of 07.02.85 and 17.09.85, the second communication accompanying summons to oral proceedings before the Board of Appeal to be held on request of the Appellant, the Rapporteur pointed out that :

- (i) the Board of Appeal does not feel obliged to take into consideration any documents such as the Appellants letter received 21.11.83 filed by the Appellant after receipt of the Statements of Grounds of Appeal, unless the Board has invited the Appellant to do so beforehand, which was not the case here.

According to Art. 114(2) the EPO may disregard facts or evidence which are not submitted in due time by the parties concerned and at the date of receipt of the said letter (21.11.83) the time limit set in Art. 108 for filing a written statement setting out

the grounds of appeal had already expired so as to the effect that the four sets of Claims A, B, C, and D filed with the said letter would not be taken into consideration by the Board.

- (ii) The fact that the decision to refuse by the Examining Division was issued after only one previous communication to the Applicant is not contrary to the European Patent Convention and does not constitute a substantial procedural violation in the sense of Rule 67 representing one of the requirements to be satisfied according to this Rule in order to justify reimbursement of the appeal fee.

According to Rule 86(2) and (3) an Applicant is entitled to amend his application twice of his own volition. In the present case the Applicant has not availed himself of these two opportunities.

According to Rule 86 (3) he needs the consent of the Examining Division for further amendments, so that the Examining Division was fully entitled to decide upon the application after the first communication and to refuse the application exclusively on grounds which had already been mentioned in their first communication, satisfying in this way also Art. 113(1).

- (iii) Concerning the merits in substance of the application the Board takes the same view as the Examining Division in that the application does not comprise patentable subject-matter because of lack of inventive step with regard to the Orban article.

- VI. (i) In his Statement of Grounds, and in his replies of 05.06.85 and 12.11.85 to the Rapporteur's communication (the reply of 12.11.85 having enclosed thereto an affidavit by Mr. J.F. Hemmer of RCA Labs Zurich), the Appellant argued as follows :

The achievement of the inventor consists in leaving the well-known road of using delay line filters and all pass filters known from the prior art as presented by the Orban article and the Orban patent, US-A-3 670 106 and the inventor is the first one to realize that also filters of a different composition can be used.

Orban's article and his US patent represent indeed the closest prior art. However, Orban still clings to the kind of delay line filters already used by Lauridsen of the Danish National Broadcasting System in 1956. The construction of an all pass filter, as used by Orban is very elaborate and expensive, because its design is very critical.

Every filter designer will avoid using and constructing all pass filters, if he can under the circumstances afford to do so. After Lauridsen who used delay lines which also constitute a sort of all pass filters, Orban has not recognized that he also could use filters of a different structure. The Applicant did recognize this and carried it out.

The present pseudo-stereo system is intended for TV sets and has therefore the advantage that it is much cheaper than the Orban system which was never intended to be used in TV sets and certainly will never be used therein because it is far too expensive.

The price of a TV set being very critical, only a cheap pseudo-stereo system like the one according to the present invention can be used for mass production of TV sets provided with pseudo-stereo. The present inventor was the first one to realize that and he put it into practice.

- (ii) The Appellant put forward during the oral proceedings that an important aspect of the present invention consists in the amplitude versus frequency characteristics obtained as represented in Figs. 4, 5 and 7 of the application and concerning these characteristics especially the particular choice of the points of maximum attenuation, the points of minimum attenuation and the crossover points of the amplitude-frequency curves of the two quasi stereo signal channels, the latter specifically in relation to the statistically calculated frequencies F_1 , F_2 , F_3 . The Appellant made it clear that there exists an interrelation between these entities and although he did not say so explicitly he was implying that the filters used in the present invention achieved the right measure of flexibility to enable the inventor to define these frequencies in an optimal way and to fabricate his system accordingly.

(iii) Apart from the foregoing the Appellant declared in the oral proceedings that the filter of the application is fundamentally different from that of the Orban patent. This was clearly shown by the affidavit by M. Hemme, he said. Although he said it was not entirely the same thing, the Appellant admitted that in Fig. 1 of the Orban US patent the combination of the network with transfer function $H(S)$ and the subtractor circuit 14, this subtractor being fed at one of its inputs by the signal coming from $H(S)$ and at its other input directly by the mono signal, corresponds to the sole network $H(S)$ of the application (schematically represented in Fig. 1 of the application). In the application the output of $H(S)$ constitutes the signal of the first one of the pseudo-stereo channels, while in the Orban patent this is the output of the said combination, i.e. the output of subtractor 14.

The principal difference between the circuits of the application as represented in its Fig. 1 and that of the Orban patent, as represented in its Fig. 1, however is according to the Appellant to be found in the fact that in the application the output of the $H(S)$ network (i.e. the signal of the first pseudo-stereo channel) is being combined with the original monosignal in subtractor 40 to form the signal for the second pseudo-stereo signal channel, while in the Orban patent the signal of the first pseudo-stereo channel is not directly used for composing the second pseudo-stereo channel signal. On the contrary : in Fig. 1 of the Orban patent the output of the network $H(S)$ is once more combined with the original mono signal, this time in an additive fashion by adder circuit 12.

- (iv) The Appellant emphasized in the oral proceedings that an important difference between the application and the Orban citations consisted in the fact that the application provides the centering of the voices, this being an aspect in which Orban was said not to be interested at all and that he did not mention it for that reason.

The centering of voices with the system of the application was said to be obtained by the specific choice of the cross over points of the amplitude frequency characteristics of the two pseudo-stereo signal channels, especially the cross over point at 320 Hz.

The proper centering of the voices was said to be of particular importance in the application of the invention to a TV set, where the two loudspeakers are placed at opposite sides of the TV screen, which constitutes an application entirely not envisaged by Orban.

- VII. At the oral proceedings the Appellant requested that a patent be granted on the basis of the following items :

One of the alternative claims, as modified, filed on 05.06.85

Additionally, Claims 2-13 as originally filed on 07.03.80
Description as originally filed with the insertion on page 2 according to Annex 1 of the letter received on 05.06.85

The modification mentioned concerns the elimination of an unnecessary limitation the Appellant said to have discovered in all versions of Claim 1. This limitation consists according to him in that H(S) is defined in the claim as having a corresponding number of attenuated

intensity portions (notches) in the frequency response over the said audio range, for instance two notches, i.e. two maxima of attenuation, and one minimum of attenuation as indicated by curve 300 in Fig. 4 of the application. He also wishes Claim 1 to cover the case which is the complement of this, i.e. H(S) comprising one maximum and two minima of attenuation, as indicated by curve 400 in Fig. 4 of the application.

The Appellant asked at the end of the oral proceedings to be allowed to submit new Claims 1, amended to this effect.

The Board of Appeal was not prepared to receive such belated claims. In fact the Appellant had already been given an opportunity to submit new amendments up to one month before the oral proceedings with the Board's communication of 17.09.85 pursuant to Art. 11(2) of the Rules of Procedure of the Boards of Appeal and has availed himself of that opportunity by his letter received on 12.11.85.

Nevertheless the Board declared itself prepared if appropriate to take into account the amendment to the three different versions of Claim 1 when considering these three versions received with the letter of 05.06.85 as annexes 2, 3 and 4.

In the following these three versions of Claim 1 will be referred to as Claims 1(2), 1(3) and 1(4).

VIII. The complete set of claims reads as follows :

1(2). A stereo synthesizer for synthesizing stereo sound outputs from a monophonic input signal, comprising circuitry responsive to the receipt of such monophonic signal for producing first and second signals which, in complementary fashion, vary in amplitude as a function of frequency each in accordance with an amplitude-versus-frequency characteristic which exhibits alternating maximum and minimum attenuation within an audio frequency range occupied by said monophonic signal, first utilization means for producing one of two synthesized stereo sound outputs from said first signal, and second utilization means for producing the other of said synthesized stereo outputs from said second signals, characterized by a plural number of frequency responsive filter networks (200, 220) cascaded to form a transfer function circuit (20) responsive to said monophonic signal (M) for producing a signal (H(S)) with a corresponding number of attenuated intensity portions in the frequency response over said audio range, and a difference circuit (40) responsive to the intensity modulated signal from said transfer function circuit and said monophonic signal for developing a complement signal ((M - H(s)) or (H(s) - M)) representative of the difference therebetween, said first utilization means (42, 170) being responsive solely to the intensity modulated signal from said transfer function circuit for directly producing the one synthesized stereo sound output, and said second utilization means (172) being responsive to said complement signal for producing the other synthesized stereo sound output.

1(3). A stereo synthesizer for synthesizing stereo sound outputs from a monophonic input signal, comprising circuitry responsive to the receipt of such monophonic signal for producing first and second signals which, in complementary fashion, vary in amplitude as a function of frequency each in accordance with an amplitude-versus-frequency characteristic which exhibits alternating maximum and minimum attenuation within an audio frequency range occupied by said monophonic signal, first utilization means for producing one of two synthesized stereo sound outputs from said first signal, and second utilization means for producing the other of said synthesized stereo outputs from said second signals, characterized by a plural number of frequency responsive filter networks (200, 220) constituted solely by passive components and cascaded to form a transfer function circuit (20) responsive to said monophonic signal (M) for producing a signal (H(S)) with a corresponding number of attenuated intensity portions in the frequency response over said audio range, and a difference circuit (40) responsive to the intensity modulated signal from said transfer function circuit and said monophonic signal for developing a complement signal ((M - H(s)) or (H(s) - M)) representative of the difference therebetween, said first utilization means (42, 170) being responsive solely to the intensity modulated signal from said transfer function circuit for directly producing the one synthesized stereo sound output, and said second utilization means (172) being responsive to said complement signal for producing the other synthesized stereo sound output.

- 1(4). In combination, a video display medium having loudspeakers disposed adjacent opposite sides thereof, and a stereo synthesizer for feeding to said loudspeakers synthesized stereo sound signals derived from a monophonic signal, said combination being characterized in that said stereo synthesizer comprises : a transfer function circuit (20) including a plural number of cascaded frequency responsive filter networks (200, 220) responsive to the receipt of such monophonic signal (M) for producing an intensity modulated signal (H(s)) which varies in amplitude as a function of frequency in accordance with an amplitude-versus-frequency transfer characteristic which exhibits alternating maximum and minimum attenuation within an audio frequency range occupied by said monophonic signal, with the minimum attenuation frequencies respectively determined by said filter networks; and a difference circuit (40) responsive to said intensity modulated signal (H(s)) and said monophonic signal (M) for developing a difference signal (M-H(s)) or (H(s)-M)) representative of the difference therebetween, one of said loudspeakers (170) being responsive solely to said intensity modulated signal (H(s)) as one of said synthesized stereo sound signals, and the other (172) of said loudspeakers being responsive to said difference signal ((M-H)s) or (H(s)-M)) as the other of said synthesized sound signals.
2. A stereo synthesizer according to Claim 1, characterized in that said transfer characteristic exhibits minimum attenuation at said first and third spaced frequencies and maximum attenuation at said second frequency.

3. A stereo synthesizer according to Claim 1 characterized in that said transfer characteristic exhibits maximum attenuation at said first and third spaced frequencies and minimum attenuation at said second frequency.
4. A stereo synthesizer according to Claim 3, characterized in that said amplitude-versus-frequency characteristic is produced by first and second cascaded both filters.
5. A stereo synthesizer according to Claim 4, characterized in that said filters are twin-tee notch filters of which the impedance of the second is greater than the impedance of the first.
6. A stereo synthesizer according to any preceding claim characterized in that said difference circuit and said first utilization means respectively comprise first and second differential amplifiers (40, 42) having corresponding (+) inputs thereof receptive of said intensity modulated signal $H(s)$, said first differential amplifier (40) having its other (-) input receptive of said monophonic signal and said second differentiating circuit matching the signal path through it to that through the first differentiating amplifier.
7. A stereo synthesizer according to any preceding claim characterized by means (106) for applying said monophonic signal (M) to said difference circuit (40) with variable amplitude.

8. A stereo synthesizer according to any preceding claim characterized in that said first and second utilization means comprise switch means (15) operable to one condition for coupling said intensity modulated signal and said difference signal to respective loudspeakers (170, 172) for reproducing said first and second synthesized stereo sound signals, and to a second condition for alternatively coupling said monophonic sound signal to both of said loudspeakers.
9. A stereo synthesizer according to any preceding claim characterized in that said first and second utilization means comprise respective loudspeakers (170, 172) disposed adjacent opposite sides of a visual display medium (182) such a television or movie screen, said transfer function circuit (20) and first utilization means (42, 170) forming a first stereo signal channel, and said transfer function circuit (20), said difference circuit (40), and said second utilization means (172) forming a second stereo signal channel.
10. A stereo synthesizer according to Claim 9 characterized in that the amplitude-versus-frequency characteristics (300, 400) of said first and second stereo signal channels exhibit crossover points, at which the amplitudes of said amplitude-versus-frequency characteristics are equal, at a fourth frequency (320 Hz) intermediate said first and second frequencies and at a fifth frequency (1680 Hz) intermediate said second and third frequencies.
11. A stereo synthesizer according to Claim 10 characterized in that said fourth frequency (320 Hz)

is substantially equal to the average frequency of maximum intensity of the human voice, and said fifth frequency (1680 Hz) is substantially equal to the average of the second formant frequencies of the human voice.

12. A stereo synthesizer according to Claim 9, 10 and 11 characterized in that said transfer function circuit (20) also modulates the phase of its output signal $H(s)$ in accordance with a phase-versus-frequency characteristic which exhibits phase variation with frequency, and that said difference signal exhibits a substantially constant phase relationship with said intensity and phase modulated signal over portions of said audio frequency range lying below the first of said spaced frequencies (150 Hz), lying between said first frequency (150 Hz) and said second frequency (700 Hz), lying between said second frequency (700 Hz) and the third of said spaced frequencies (4600 Hz), and lying above said third frequency (4600 Hz), said difference signal departing from said constant phase relationship in the immediate vicinity of said first, second and third frequencies (150, 700, 4600 Hz).
13. A stereo synthesizer according to Claim 12 characterized in that said substantially constant phase relationship is substantially 90 degrees.

II. Reasons for the Decision

1. The prior art parts of Claims 1(2) and 1(3) are identical and this common prior art part is known from the Orban article, mentioned under II. In particular Fig. 2 of this

article shows the complementary amplitude versus frequency characteristics of the electrical circuits used for the two sound channels of the stereo synthesizer described therein.

The characterizing part of Claim 1(2) describes essentially the block diagram of Fig. 1 of the application; adding to this block diagram that the transfer function circuit with a number of attenuated intensity portions in the frequency response, i.e. the comb filter which produces a signal $H(S)$ in response to the monophonic signal (M) , is formed by a plural number of frequency responsive filter networks. Fig. 1 also contains indications for the signals M , $H(s)$ and $M-H(S)$ at the appropriate places where they occur in this block diagram as well as symbols for these signals which schematically represent their amplitude versus frequency characteristics. Claim 1(3) distinguishes itself from Claim 1(2) solely in that the "frequency responsive filter networks" according to the first line of the characterizing part of Claim 1(2) are specified as "constituted solely by passive components" according to the second line of the characterizing part of Claim 1(3) and thus Claim 1(3) is limited with respect to Claim 1(2) by this further feature.

The circuits described in the characterizing portions of Claims 1(2) and 1(3) for the realization of the amplitude-frequency characteristics known from Fig. 2 of the Orban article are certainly novel, but in the view of the Board of Appeal do not imply an inventive step. It is as has been noted on page 8, lines 32-34 of the description : that the circuit providing the $H(S)$ function may be implemented in a variety of ways not fully described in this application.

Indeed, amongst a considerable number of other possibilities, the circuits according to the characterizing part of Claims 1(2) and 1(3) constitute an obvious way for the skilled person to obtain two electrical signal channels with

complementary voltage-versus-frequency characteristics. And since the use of two channels with such complementary characteristics in a stereo synthesizer is known from the Orban article, it is obvious to use circuits as mentioned in the characterising parts of Claims 1(2) and 1(3) in such a synthesizer. Therefore neither of Claims 1(2) and 1(3) can be allowed because of lack of inventive step (Articles 52 and 56).

2. If the Appellant contends that the problem of realizing the present stereo-synthesizer has never before the priority date of this application been formulated as having to realize the filter characteristics for the two signal channels as complementary characteristics in accordance with Fig. 2 of the Orban article, it should be pointed out that already Schroeder in his article "An artificial stereophonic effect obtained from a single audio signal" in Journal of the Audio Engineering Society, April 1958, Vol. 6, No. 2, pages 74-79 has shown that the delay-line approach of both Lauridsen, mentioned in the description on page 2, and Orban in his article, i.e. with effectively different time delays in the two channels, is equivalent to having different voltage frequency characteristics in these channels. This constitutes in the view of the Board of Appeal a clear hint to using electrical filters instead of delay lines for creating two signal paths with complementary voltage ~~vs~~ vs frequency characteristics. Indeed does Schroeder use electrical filters according to Figs. 5 and 7-10 of his article to achieve two electrical signal paths with complementary voltage-versus-frequency characteristics and this for the same purpose as the present application, i.e. for the two sound channels of a stereo synthesizer. For the same purpose is the use of band filters known from DE-C-944 799 (inventor Meyer-Eppler).

So it is not the merit of the inventor of the present invention to have left the road of delay line and all pass filters; Schroeder and Meyer-Eppler had done that before him.

It is noted here that this work of both Schroeder and Meyer Eppler was mentioned to the Appellant in the same context in the Board's first communication of 07.02.85.

Moreover, it is to be noted that both Schroeder and Meyer Eppler use frequency responsive filter networks constituted solely by passive components in accordance with the feature which distinguishes Claim 1(3) with regard to Claim 1(2).

3. It is of course true that Orban as well in his US patent US-A-3 670 106 also cited in the Board's communication of 07.02.85, as in his article, is pursuing Lauridsen's method of using delay lines. Orban has only replaced the delay lines by all pass networks which need active elements such as transistor amplifiers. Because of the functional equivalence of these all pass networks to delay lines he needs in all of his circuits two summing circuits, i.e. one for adding and one for subtracting, as is shown in Fig. 1 on page 158 of his article and in Figs. 1 and 6 of his cited US patent and therein of course also in those drawings which constitute a complete circuit of the schematical diagrams these Fig. 1 and 6 indicate.

Therefore the structure of the circuit according to Fig. 1 of the present application must be different from those of Orban, since block 20 in Fig. 1 of the application possesses already a comb filter in itself, but this difference does not make the circuit of Fig. 1 as claimed in Claims 1(2) and 1(3) less obvious.

4. Claim 1(4) is further limited with respect to Claim 1(2) in that apart from all the features of the latter, it concerns the combination of those features with a video display medium which has the loudspeakers of the stereo synthesizer disposed adjacent opposite sides thereof. The Board of Appeal considers this combination as obvious, the more so because this claim does not mention any measures which can be considered specific for this combination and which could bring about a particular effect in this context.

So in fact none of the Claims 1(2), 1(3) and 1(4) is allowable because of lack of inventive step (Articles 52 and 56).

The amendment to these three Claims 1 indicated orally by the Appellant during the oral proceedings, if applied, would not change this opinion. As the other claims, i.e. 2-13 are all directly or indirectly dependent on Claim 1, and none of the three versions of Claim 1 is allowable, these dependent claims are also not allowable.

5. As far as the arguments the Appellant has put forward refer directly to the stereo-synthesizer according to one of the Claims 1(2), 1(3) and 1(4) they have been dealt with in the foregoing.

It is to be remarked however that most of the Appellant's comments are connected to other features disclosed in the present application, but which do not occur in one of the Claims 1(2), 1(3) and 1(4) to be judged upon.

In fact most of those features are mentioned in Claims 2-13. As the Appellant has insisted, in his final request, on maintaining his Claims 1(2), 1(3) and 1(4) which do not contain those features, and since either of these claims is considered not allowable, the Board need not further go into those features nor into the Appellant's comments concerning those features.

In his final request the Appellant has not repeated his request for reimbursement of the Appeal fee.

Order

For these reasons it is decided that :

The appeal is dismissed.

The Registrar

The Chairman

B A Norman

G Korsakoff