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Bezeichnung der Erfindung: Method and apparatus for controllably rotating an information storage disc
Title of invention:
Titre de l'invention :

Klassifikation / Classification / Classement : G11B 19/24

ENTSCHEIDUNG / DECISION

vom / of / du 19 December 1988

Anmelder / Applicant / Demandeur :

Patentinhaber / Proprietor of the patent / Titulaire du brevet : DISCOVISION ASSOCIATES

Einsprechender / Opponent / Opposant :

Stichwort / Headword / Référence :

EPÜ / EPC / CBE Art. 56

Schlagwort / Keyword / Mot clé : "Inventive step (denied) - plurality of independent obvious steps"

Leitsatz / Headnote / Sommaire

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Case Number : T 362/86 - 3.5.1

D E C I S I O N
of the Technical Board of Appeal 3.5.1
of 19 December 1988

Appellant : (Proprietor of the patent)
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Decision under appeal : Decision of Opposition Division of the European Patent Office given on 15 April 1986 and notified on 29 July 1986 revoking European patent No. 11494 pursuant to Article 102(1) EPC

Composition of the Board :

Chairman : P. Ford
Members : W.B. Oettinger
Y. Van Henden

Summary of Facts and Submissions

I. The Appellant is the proprietor of European patent No. 11 494, based on European patent application No. 79 302 593.3 filed on 15 November 1979 claiming a priority of 16 November 1978.

II. Following an admissible opposition, the Opposition Division of the European Patent Office revoked the patent at the end of oral proceedings held on 15 April 1986.

III. In a reasoned decision, dated 29 July 1986, it concluded that neither the patentee's main request, relating to the independent apparatus and method Claims 1 and 11, filed on 15 June 1985, nor his first auxiliary request, relating to an additional feature restricting said apparatus claim, nor his second auxiliary request, relating to an inclusion of the features of dependent Claims 8 and 10 in Claim 1 could be allowed.

This conclusion was based on the finding that the subject-matter of the main request lacked an inventive step having regard to the following prior art references:

(R1) FR-A-2 312 833
(R2) DE-A-2 525 830
(R6) DE-C-2 211 100

and that the same applied to the auxiliary requests having regard to general knowledge (for the first auxiliary request) and

(R5) US-A-3 753 067

(for the second auxiliary request).

Mentioned, although not used, was further, inter alia, the Oponent's following citation:

(R4) DE-A-2 812 886.

IV. The appeal was filed on 19 September 1986, the appropriate fee having been paid three days before, and a statement of grounds of appeal was filed on 4 December 1986.

V. On 10 March 1988, the Respondent withdrew his opposition.

VI. In a communication pursuant to Article 11(2) of the Rules of Procedure of the Boards of Appeal, the Board expressed its provisional view that the Opposition Division's findings were, in effect, justified.

VII. At the Appellant's request, oral proceedings were held, attended by the Appellant's representative, on 8 December 1988. In these proceedings, the Appellant requested that the decision under appeal be set aside and that the patent as amended be maintained on the basis of the following independent claims (and dependent claims, description and drawings as on file):

main request: Claims 1 and 11 handed in on 8 December 1988;

first auxiliary request: Claim 1 of main request further amended by the inclusion of "optical" before "transducer";

second auxiliary request: Claim 1 amended by the inclusion of the features of dependent Claims 8 and 10 filed on 15 June 1985.

The relevant claims read as follows:

"1. Apparatus for controllably rotating an information storage disc relative to a transducer to recover information that is stored on the disc, in a plurality of substantially circular and concentrically arranged information tracks, said apparatus operating to recover the information at a substantially constant rate, said apparatus comprising:

means (130, Figure 6) for producing a coarse speed control signal (141) that varies according to the radius of the particular information track from which the information is being recovered;

means (136) for producing a fine speed control signal (142);

means (140), responsive to the coarse speed control signal and the fine speed control signal, for producing a composite speed control signal (146) representative of the prescribed angular velocity at which the disc is to be rotated; and

means (134), responsive to the composite speed control signal, for rotating the disc at the prescribed angular velocity, whereby the information stored thereon is recovered by the transducer at the prescribed constant rate, characterised in that said means for generating a fine speed control signal includes:

means (170, 172, 176) for producing a periodic reference signal (178) having a predetermined constant frequency;

a phase-locked loop (160) for detecting a periodic signal (168) from the information recovered from the disc; and

fine speed control means (162) for comparing the relative phase angles of the detected periodic signal (168) and the periodic reference signal, and for producing said fine speed control signal (142) representative of the comparison, and in that the means (130) operates in such a manner as to ensure that the periodic signal (168) is within the "pull-in" range of the phase-locked loop (160).

8. Apparatus as defined in any of the preceding claims, wherein:

said means for producing a composite speed control signal includes means (140) for summing together the coarse speed control signal and the fine speed control signal, to produce a composite voltage signal, and voltage-controlled oscillator means (132), responsive to the composite voltage signal, for producing the composite speed control signal, said composite speed control signal having a frequency substantially inversely proportional to the composite voltage signal; and

said means for rotating the disc is responsive to the frequency of the composite speed control signal.

10. Apparatus as claimed in any of the preceding claims in which the means (134) responsive to the composite speed control signal comprises a servo including a comparator (152) of the composite speed control signal and a signal dependent on the speed of a motor (148) for rotating the

disc whereby the angular velocity of the disc is made to follow the composite speed control signal (146).

11. A method for controllably rotating an information storage disc relative to a transducer, to recover information that is stored on the disc in a plurality of substantially circular and concentrically arranged information tracks, wherein the information is recovered from the disc at a substantially constant rate, characterised in that the method is carried out using apparatus as claimed in any one of the preceding claims."

VIII. The Appellant reformulated his arguments in favour of an inventive step, as far as these were maintained, essentially as follows:

Main Request:

A phase-comparator is only effective if the frequencies of the signals to be compared are sufficiently close together. A replacement of the frequency discriminator 5 of R1 by a phase-comparator, as known from R2 with disc rotation control to a constant angular velocity, would not appear, to the skilled person, to be a satisfactory improvement of the disc rotating apparatus of R1 in which, due to its angular velocity being dependent on the track radius in order to achieve a constant tangential velocity, the frequencies tend not to be close together.

In the claimed invention, this replacement must be considered together with the insertion of a phase-locked loop in the path of the signal recovered from the disc.

Although it is true that a phase-locked loop solves, in the claimed invention, the problem addressed in R6, no

incentive could be derived from either R2 or R6 to combinedly apply the features known from these citations in an apparatus according to R1.

For the same reasons, Claim 11 should be allowable.

First subsidiary request:

R1 will be understood by the skilled person to relate to audio disc recording only, although it is not restricted thereto. The person dealing with optical video recording will not therefore expect to find in R1 what he wants when designing an apparatus having the precision required in this field.

The same would seem to apply to R2. In any case, the skilled person would look for other prior art documents when seeking solutions for any accuracy problems arising in his field.

Second auxiliary request:

The application of a constant speed control servo, known as such from R5, in an apparatus where a disc is to be rotated with a radius dependent angular velocity, appears far-fetched. No such suggestion can be derived from the prior art.

IX. At the conclusion of the oral proceedings, the Board stated that a final decision would be given in writing.

Reasons for the Decision

1. The appeal is admissible.

The Patentee's appeal against the decision to revoke his patent and his request to set aside this decision are not affected by the Respondent's having withdrawn his opposition.

2. The question whether the amendments made to the claims comply with Article 123(2) and (3) EPC has been considered by the Board but did not give rise to an observation. The last sentence in Claim 1 is regarded as being derivable from column 7 lines 24 to 29 of the description.

3. The subject-matter of all claims is new, as will be immediately apparent from the following considerations on the question of inventive step.

4. In the opinion of the Board, the subject-matter of the independent claims in all versions lacks an inventive step and the decision under appeal must therefore be confirmed.

The reasons for this finding will be set out in more detail in the following paragraphs.

5. Claim 1, main request:

5.1 R1 is the prior art document coming nearest to the claimed invention, as it discloses a disc motor control ensuring a track radius dependent rotation speed so that the (relative) tangential transducer velocity is constant and as the other features in the preamble of Claim 1 are also known from this document. The "means for producing a fine speed control signal" consist in this case of a frequency discriminator (5) delivering a fine speed control signal representative of the deviation of the frequency of the

periodic signal, detected from information recovered from the disc, from the center frequency of the discriminator.

5.2 From R2, in the same context a phase-comparator comparing the frequency and phase of the detected periodic signal from the disc with those of a reference signal is known. The apparatus is of the kind in which the speed control is not radius dependent but this is irrelevant for the conditions which apply to the fine speed control loop. In both cases, represented by R1 and R2, the reference signal is of a constant frequency and the detected periodic signal is, in the steady state, synchronised to this reference signal.

The only difference is that the phase-comparator is superior to the frequency discriminator in respect of accuracy which is a well known fact.

It is therefore clearly obvious to replace said frequency discriminator by said phase-comparator.

5.3 From R6 a phase-locked loop is known as a means for eliminating noise signals from a periodic signal, in particular a periodic pulse signal.

The detected periodic signal in the apparatus of R1 being such a signal, it is clearly obvious to apply a phase-locked loop in the path of this signal in order to make use of its noise eliminating properties.

5.4 It follows from the above, that the Opposition Division was correct in saying that the replacement of the frequency discriminator of R1 by a phase-comparator as known from R2 and the insertion of a phase-locked loop known as such from R6 are independent improvements of the apparatus of R1 and

as they are obvious, their combined application is also obvious.

5.5 It is quite clear that, in the apparatus of D1, it is only when the disc rotates, after start-up, at a speed approaching its nominal rotation speed, depending on the track radius, that the frequency of the detected periodic signal will lie within the working range of the frequency discriminator.

Likewise, it is clear that a similar condition applies to the phase-comparator of R2, albeit for a nominally constant rotation speed.

If a phase-locked loop is inserted, this does not change anything in this respect because the phase-locked loop does not change the frequency of the detected periodic signal. The only additional condition is that the pull-in range of the phase-locked loop must be large enough to cover the range of possible deviations of the frequency of the detected periodic signal from the nominal frequency. This is, however, for the skilled person, only a matter of course.

The feature added, in Claim 1, as filed on 8 December 1988, to Claim 1, as filed on 15 June 1985, does not therefore restrict the claimed apparatus by any unobvious particularity.

6. Claim 11, main request:

Claim 11, as filed on 8 December 1988, makes it clear that it seeks protection for the normal use of the apparatus of Claim 1.

This apparatus being obvious, its normal use is also obvious.

It was, moreover, agreed by the Appellant's representative during the oral proceedings that any conclusion reached for Claim 1 on the question of inventive step would also apply to Claim 11.

7. First subsidiary request:

The above findings still apply if Claim 1 is restricted to an optical transducer:

7.1 The apparatus of R1 is not restricted to a particular kind of transducer although in an embodiment, shown in the drawings, a magnetic transducer is shown (implying that the disc is magnetic).

7.2 However, optical transducers (implying that the disc is optical) have also been made available (as documented for instance by R4).

The skilled person would therefore consider using the apparatus of R1 even if the transducer (and the disc) are optical.

7.3 The considerations which would lead him to replace the frequency discriminator by a phase-comparator and to insert a phase-locked loop (cf. paragraphs 5.2 to 5.5) would still be the same.

Any stricter accuracy requirements implied by the use of an optical transducer, e.g. for video applications, would be an even greater incentive to consider the improvements made available by R2 and R6.

8. Second subsidiary request:

The Appellant's arguments in favour of an inventive step of the combined subject-matter of Claims 1, 8 and 10 have been carefully considered but found unconvincing for the following reasons:

8.1 A servo as defined in Claim 10 is known from R5 for the efficient and compact precision regulation of electric motors in general, for instance in a motion picture camera.

Disk rotation control having similar general requirements, the additional use of such a servo in the disc control apparatus of R1, possibly modified or supplemented in the way rendered obvious by R2 and R6, will lie within the considerations which the skilled person seeking to improve this apparatus would make.

8.2 In the apparatus of R5, the frequency of the signal (S-1, S-2) generated by the tachometer is directly proportional to the rotation speed of the motor (column 4, lines 17-20). This apparatus is, again, one which regulates the motor rotation speed, after start-up, to a constant value and it is for this reason that the frequency of the reference signal (T-3) is chosen to be constant. Any deviation from its nominal frequency would clearly result in the frequency and phase-comparator output signal (T-2) regulating the motor speed to a different value.

It is, for this reason, obvious that such a servo can also be applied if the motor is not to be regulated to a constant rotation speed but to one which, for whatever reasons, is to vary.

8.3 Such being the case in an apparatus of the kind known from R1, the applicability of the servo known from R5 in this apparatus must be regarded as obvious, including the implication that the frequency of the reference oscillator (61 in R5) must then be made dependent upon the composite (coarse and fine speed) voltage signal; in other words: the oscillator must be "voltage controlled".

8.4 This further improvement of the apparatus of the kind of R1 is also independent of those suggested by R2 and R6. The teachings of R5 could be applied even if those of R2 and/or R6 are not applied.

For this reason, the combined application of all three improvements, individually known from R2, R6 and R5, in the apparatus of R1, albeit requiring the skilled person to take three steps, has to be regarded as an obvious collocation of features, i.e. not involving an inventive step.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar The Chairman

F.Klein P. Ford