

COMMISSIONER'S DECISION

Non-Statutory subject matter. System relates to more than making calculations and mere information. Some claims were considered as setting forth more than mere calculation. Rejection withdrawn.

This decision deals with Applicant's request that the Commissioner of Patents review the Examiner's Final Action on application 268,804 (Class 354-54). The application was filed December 29, 1976, by Dialog Systems, Inc. and is entitled SPEECH RECOGNITION APPARATUS. The inventor is Stephen L. Moshier. The Examiner in charge issued a Final Action refusing the application.

The Patent Appeal Board held a Hearing on November 24, 1982, at which the Applicant was represented by R.D. McKenzie, the Patent Agent. In discussing computer related matter Mr. McKenzie referred to publications and to United States jurisprudence and the extent to which such matter has been found patentable in the United States. He particularly discussed the jurisprudence with respect to the patentability of Applicant's computer related invention. He further requested that it be scrutinized by the Board with a view to revising the present five guidelines set down in 1978 in the Schlumberger decision. We thank him for his interest in this field, and for the information submitted.

The application relates to a system for recognizing a speech signal as shown by figure 1 of the application, reproduced below. An analog voice signal 11 is introduced into an analog-to-digital converter 13, which digitizes it. An autocorrelator 17 further processes it to obtain at 19 an autocorrelation function comprising 32 values each calculated to a 24-bit resolution, at the rate of 100 functions per second. These functions are subjected to a Fourier transformation at 21, and corresponding power spectra 23 are then obtained. These spectra are short-term and are frequency band equalized at 25. Such equalization is performed as a function of the peak amplitude occurring over a certain interval. These are generated at the rate of 100 per second also and have 32 channels evaluated to a 16-bit accuracy.

The system compensates for differences in speaking rates at 29 by accumulating the magnitude of all amplitude changes in all channels over an interval. This form of subjective time evaluation provides a basis for selection of twelve of the frequency band equalized spectra to provide a representation of the word or sequence of phonemes appropriate for recognition purposes. This selection is performed at 31.

To obtain final evaluation of the voice signal, the amplitude values of the selected spectra are subjected to non-linear scalar transformation to improve the accuracy of matching a spoken signal with the stored reference vocabulary. This matching is performed by the likelihood evaluator 41 after a vector transformation of the signal is obtained at 37.

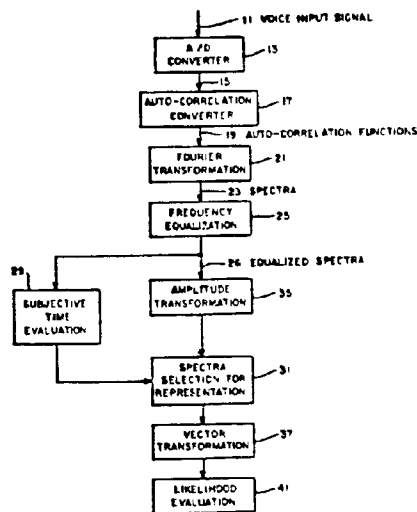


FIG. 1

In the Final Action the Examiner rejected the application for being directed to non-statutory subject matter under Section 2 of the Patent Act. He said:

. . .

...In order that claims to a process be patentable it is necessary to disclose novel apparatus to carry out the process in accordance with Section 36(1). The disclosure remains rejected as inadequate in this respect on pages 17 and 18.

. . .

...Thus even though only a process is being claimed it is necessary to disclose in accordance with Section 36(1) of the Patent Act the novel apparatus designed to carry out the process. The applicant has not disclosed such novel apparatus but has merely disclosed a computer program which could be carried out on a known computer, i.e. a PDP11 computer (page 20 line 1 of the disclosure).

. . .

...In order to determine the allowability of claim 1, therefore, it is necessary to look to the disclosure to determine if the claimed method is carried out with novel apparatus. Claim 1 is not objectionable because it is disclosed as being carried out by computing apparatus but rather because the apparatus is not novel.

. . .

The Summary of the Invention section does not make mention of any sort of apparatus to carry out the method claimed therein. As such it is inadequate, taken by itself, to satisfy the requirements of Section 36(1). To satisfy these requirements reference must be made to the Description of the Preferred Embodiment section. Therein it is disclosed that: "In the present embodiment, the Fourier transformation, as well as subsequent processing steps, are performed under the control of a general-purpose digital computer" (page 5, lines 17 to 20). The mere absence of the mention of computer apparatus in the Summary of the Invention section does not overcome the objection that novel apparatus has not been disclosed to carry out the method claimed. Figure 3 is a flow chart of the claimed method. Page 10 line 20 indicates that the function represented in figure 3 is provided by a computer program. Thus the Summary of the Invention section describes the claimed method while the Preferred Embodiment section discloses that the preferred apparatus is a general purpose computer.

. . .

The "specially constructed electronic system" is taken to be the autocorrelator disclosed with reference to figure 2. This apparatus is disclosed on page 3 line 2 as performing initial operations in the overall process. Hence the claimed method is carried out by general purpose computer apparatus. The applicant is not being "penalized" for what he has disclosed. The objection arises because of what the applicant has not disclosed, namely, novel apparatus to carry out the claimed method.

. . .

In Applicant's letter of response, he presented his reasons to justify the patentability of the application, and cited Schlumberger v Commissioner of Patents, 56 CPR (2d) p.204, at p. 206(1981):

. . .

"I am of opinion that the fact that a computer is or should be used to implement discovery does not change the nature of that discovery."

and said:

Admittedly, this statement was used by Pratte J. to show that the use of a computer to implement a discovery does not transform a non-patentable discovery into a practical and patentable embodiment of the discovery. However, consistency and symmetry require that Pratte J. did not intend the above-quoted statement to be limited in its direction of application. Consistency and symmetry require that the statement was intended to have a bi-directional application, that is, in addition to meaning that the use of a computer cannot transform a non-patentable discovery into a patentable embodiment of that discovery, it similarly means that the use of a computer cannot transform an otherwise patentable invention into non-statutory subject matter merely because the computer is involved.

This view of the Court of Appeal that computers do not change the nature of an invention and that inventions involving computers are to be treated no differently than other inventions is expressed even more clearly at the beginning of the Reasons. At page 205 of the Report, Pratte J. reviews the Commissioner's rejection of Schlumberger's application and states his interpretation of that rejection:

"The Commissioner founded his rejection of the appellant's application on the reasons stated by the Patent Appeal Board in their recommendation. That recommendation, as I understand it, was based on the view that the appellant in effect claimed a monopoly on a computer programme and on the further view that such a programme, even if it were new and useful, is not an invention within the meaning of Section 2.

Then, in the next paragraph, in what is submitted is a clear refusal to accept the view of the Patent Appeal Board, Pratte J. states that there is no basis for rejecting claims merely because the subject matter thereof involves computers. He says:

"As the Patent Act contains no provision specifying or even implying a limitation of the meaning of the word "invention" in Section 2 of the Act so as to exclude invention involving computers, there does not exist any reason for saying that the discovery claimed by the appellant, assuming it to be new and to have required inventive ingenuity, is not a patentable invention within the meaning of Section 2 of the Act."

It is the applicant's submission that the above passage in particular, and the Court's Reasons in general, make it clear that the law is that inventions involving computers are not non-patentable merely because computers are involved and that inventions involving computers are to be treated no differently than other types of inventions.

. . .

Applicant argued in that response that the issues here were different from those in Schlumberger.

The ratio decidendi of the Schlumberger case is stated at page 206 of the report and it is the following:

"A mathematical formula must be assimilated to a 'mere scientific principle or abstract theorem' for which s-s. 28(3) of the Act prescribes that "no patent shall issue".

Therefore, the Court of Appeal rejected Schlumberger's application not because it claimed an invention that involved a computer but because the essence of the claimed invention was "the discovery of the various calculations to be made and of the mathematical formulae to be used in making those calculations" for which no patent could issue due to the prohibition of Section 28(3).

It is clear that a mere scientific principle or abstract theorem is not proper subject matter for a patent, however, the applicant submits that there is and must be a distinction between a bald or mere scientific principle which is not patentable and a method of producing a useful result which utilizes a scientific principle and which is patentable. The applicant submits that Schlumberger's case falls within the former category whereas the present application falls within the latter category.

The present application claims subject matter that goes far beyond making certain calculations according to certain formulae. The inventor of this application has applied his inventive ingenuity to his scientific knowledge and has invented a method of obtaining an improved, frequency-compensated audio signal. In applying his inventive ingenuity the inventor has clearly made use of scientific principles and mathematical relationships which allow persons to understand and explain physical phenomena. The scientific community has found it possible and useful to describe and represent audio signals mathematically in terms of their frequency content and the inventor has made use of these mathematical representations of audio phenomena in order to describe what is to be done according to the invention. But, the applicant is clearly not attempting to obtain a patent for any mere scientific principle or abstract theorem in contravention of Section 28(3) of the Patent Act; it is

attempting to obtain a patent for a method of producing an improved, frequency-compensated audio signal which only makes use of certain mathematical representations and which is patentable in accordance with the principles of Canadian patent law.

The applicant further submits that if a claim recites what is to be done according to the invention and does not claim a mere scientific principle or abstract theorem, it is irrelevant as to what sort of "tool" or device is used to implement how the invention is to be carried out. In particular, it is submitted that the use of a computer to make some "calculations" does not necessarily mean that the subject matter of the whole claim is assimilated to a mere scientific principle or abstract theorem. In the present case, a mechanical tabulator using toggles and cams, or analog or digital hardware can be used to implement aspects of the invention, in which case it would be absurd to suggest that the invention was assimilated to a mere scientific principle or abstract theorem.

. . .

The issue before the Board is whether or not the application and the claims are directed to patentable subject matter in view of Section 2 of the Patent Act.

At the Hearing, Mr. McKenzie discussed his invention with reference to the Canadian Schlumberger case, as well as certain United States Court cases, among them, Diamond v. Diehr 209 USPQ 1; in re Taner 214 USPW 678; in re Abele 214 USPW 682; in re Pardo 214 USPW 673; in re Mayer 215 USPQ 193. We are urged by him to view his computer related invention as one which falls within acceptable guidelines of patentability in the United States.

The Board views this United States jurisprudence as being not divergent in principle from the interpretation given to Section 2 of the Canadian Patent Act in Schlumberger in the first of the above quoted paragraphs in Applicant's argument. We are of the view however, that the passage taken from page 205 of Schlumberger, included above as part of Applicant's response, is a reiteration of the argument presented in that case by Schlumberger, rather than part of the findings of the case.

The Examiner says that it is necessary to look to the disclosure. This was also expressed in Schlumberger supra at p.205 as follows:

In order to determine whether the application discloses a patentable invention, it is first necessary to determine what, according to the application, has been discovered.

The Applicant shares that view in his response as he argues that his subject matter goes beyond making calculations and that it is the "...what is to be done according to the invention." that has to be described. We now turn to the application to find what is disclosed.

We observe on page 7 that reference is made to evaluating a spoken word by subjecting certain amplitude values to a non-linear scalar transformation which is performed on frequency band equalized spectra, and that improved accuracy in matching an unknown speech signal with a known signal is obtained. The application then states that the actual comparison is performed after a vector transformation, followed by action by a likelihood evaluator. The description of figures 1 and 2 relates an overall system containing elements which provide an indication of the match of voice signals. In view of the above parts of the application we agree with the Applicant that a system has been disclosed which is directed to a useful end result and is not merely directed to making calculations nor to the presentation of an algorithm and its solution. We are persuaded that such an indication of a match of voice signals by the disclosed apparatus represents more than mere information and that it is not comparable with the subject matter that was denied patent protection in Schlumberger. We are satisfied that the application is directed to patentable subject matter and we find that the refusal of the application on that ground should not be maintained.

Turning now to the claims, we first consider claim 1, which reads:

In a speech analysis system in which an audio signal is spectrum analysed to determine the behavior of formant resonances over an interval of time, a frequency compensation method comprising:
repeatedly within said interval, evaluating a set of parameters determining the short-term power spectrum of said audio signal in a subinterval within the said interval, thereby to generate a sequence of short-term power spectra; for each parameter in the set, determining the maximum value of the parameter occurring over the interval, the set of maximum values thereby determined corresponding to a peak spectrum over the interval;
smoothing the peak spectrum by averaging each maximum value with values from said set of maximum values corresponding to adjacent frequencies, the width of the band of frequencies contributing to each averaged value being approximately equal to the typical frequency separation between formant frequencies; and
for each short-term power spectrum in said sequence of spectra, dividing the value for each parameter in the set by the corresponding smoothed maximum value in the smoothed peak spectrum, thereby to generate over said interval a sequence of frequency band equalized spectra corresponding to a compensated audio signal having the same maximum short-term energy content in each of the frequency bands comprising the spectrum.

In our view, claim 1 merely sets out the use of a computer in a frequency compensation system to generate a sequence of frequency band equalized spectra over an interval. We find that, in effect, the equivalent of a mathematical algorithm has been presented and solved by the method found in claim 1. We find that claim 1 would effectively preempt a program for such a system and that claim 1 is not patentable.

We now consider claim 2, which reads:

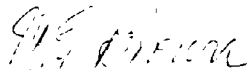
In a speech analysis system in which an audio signal is analyzed over an interval corresponding to a spoken word to determine the behavior of formant resonances relative to a sequence of reference vectors representing a pre-selected word, a method of selecting sample points within said interval comprising:
repeatedly over said interval, evaluating a set of parameters corresponding to the energy spectrum of said signal at that time, each such set of values being characterizable as a vector having a coordinate corresponding to each parameter;
summing over the said set of parameters the magnitudes of the values of the changes that occur between successive evaluations of each parameter, thereby to obtain a value corresponding to the arc length increment traversed by the multi-coordinate vector during the subinterval between successive evaluations;

accumulating the arc length increments over successive subintervals so as to obtain a sequence of arc lengths throughout the said interval and a total arc length for the said interval;
dividing the total arc length into a sequence of equal length segments corresponding in number of the number of vectors in the sequence of reference vectors;
separating said sequence of arm lengths into groups, the cumulative arc length for each group being substantially equal to said equal length segments; and
for each segment, selecting a set of parameter values defining a representative vector from the vectors associated with the corresponding group of arc lengths and comparing the selected set with the parameter values defining the corresponding recognition vector, the several comparisons so performed being indicative of the match between the audio signal and the speech corresponding to the recognition vectors.

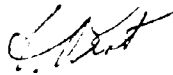
We find that claim 2 is not directed merely to an algorithm, and that it may be considered as directed to 'the what' that is to be done according to the invention disclosed. The Board is satisfied therefore that claim 2 sets forth more than a mere calculation or display.

In summary, we are satisfied that the application contains matter which expresses more than a conversion of one set of values, or numbers, into another set of values, and is in effect more than a mere scientific principle or abstract theorem. In the absence of any prior art it is our view that claim 2, and some others, may be directed to allowable subject matter.

We recommend that the rejection of the application for lack of patentable subject matter be withdrawn and that the application be returned to the Examiner for further prosecution leading to acceptable claims.



M.G. Brown
Acting Chairman
Patent Appeal Board



S.D. Kot
Member

I concur with the findings and the recommendations of the Patent Appeal Board. Accordingly, I withdraw the Final Action, and I am remanding the application to the Examiner for prosecution consistent with the recommendation.



J.H.A. Gariépy
Commissioner of Patents

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Dated at Hull, Quebec
this 11th. day of January, 1984