

COMMISSIONER'S DECISION

Sufficiency of disclosure; Section 2; Obvious

The disclosure and drawings in describing apparatus for selective manoeuvring of a cutting blade is sufficient, and relates to more than a computer program. Some arms were directed to apparatus which was not in the cited art. Rejection for insufficiency and non-patentable matter withdrawn. Rejection of certain claims withdrawn, and of the remainder maintained.

This decision deals with Applicant's request that the Commissioner of Patents review the Examiner's Final Action on application 291,377 (Class 342-5). The application was filed November 21, 1977, by Gerber Garment Technology, Inc. and is entitled METHOD AND APPARATUS FOR CUTTING SHEET MATERIAL WITH IMPROVED ACCURACY. The inventor is Heinz J. Gerber. The Examiner in charge issued a Final Action refusing the application.

The application relates generally to an automatically controlled sheet cutting machine provided with a primary program for advancing sheet material and a cutting tool relative to one another, an optional program for generating manoeuvring commands to the tool, and selective activation of the optional program.

Figure 2, reproduced below, illustrates the arrangement. The positional relationship of the pattern pieces 46 is arranged on marker 50 by a marker generator 48 and the contours of the pieces are digitized at 52 and stored in pattern memory 54 by X and Y coordinates. This data is acted upon by computing circuits 60 to form machine commands. A cutting program is stored at 64. An optional program is stored at memory 70 and contains manoeuvring instructions for orienting the tool for certain cutting operations.

Activation of an optional program in conjunction with a cutting program as appropriate may be made by means of the selector panel 72, or by the computer 12 which stores the primary and optional programs and selects the appropriate combination based on an analysis of the pattern data and cutting operation.

In an automated arrangement the marker generator supplies data of the cutting conditions on marker 50 to computer 12.

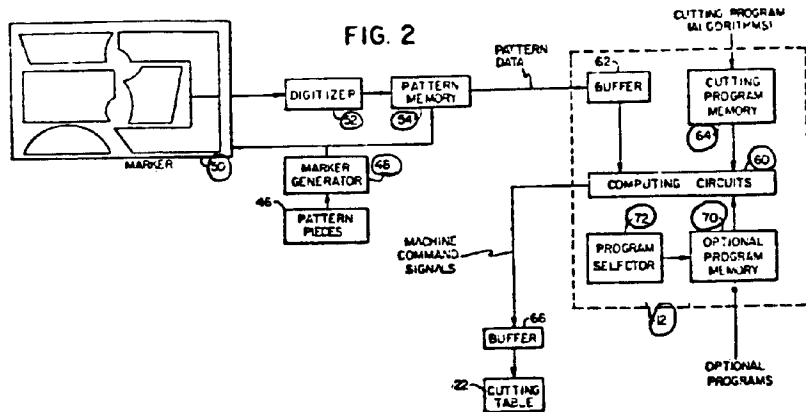


Figure 17, reproduced below, illustrates a system using actual signals from a cutting blade 252 and line follower 256 to control the blade in a manner not provided by the fixed program in memory 64, nor by the pattern memory 54. The follower sends voltage signals E_x and E_y to a feed rate programmer 282, a slope generator 284, and a yaw programmer 290. The follower and the blade sensor 292 each sends a signal indicating respective cutting line conditions to the feed rate programmer, and to the yaw programmer. The feed rate programmer energizes the x-drive and y-drive motors to advance the blade relative to the x and y axes. Generator 284 derives a signal from the ratio of the voltages received and sends it to summing junction 288 where it is added to the signal from the yaw programmer, and the resulting signal is used to modify the programmed blade orientation to meet actual cutting conditions.

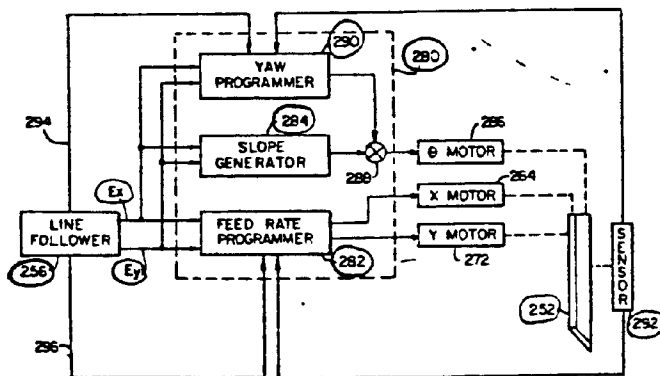


FIG. 17

In the Final Action the Examiner rejects the application because in his view it is directed to non-patentable subject matter, such as a method of programming a computer, a programmed computer, and mental steps performed by a computer programmer or a machine operator. He further rejects it for insufficiency of disclosure, and for being obvious in view of certain references. He also rejects all the claims for being directed to computer programs or modifications thereof, or to their selection by means of the mental judgement of an operator. The Examiner regards the selector means as no more than push buttons which perform the selecting steps, and also rejects the claims on this basis.

In that action the Examiner rejects several steps of claim 1, for example, on lines 6-7, 8-12, 13-15, for being mental steps performed by the programmer. He says that no apparatus is disclosed for the performance of these steps, and further that there is nothing inventive in an operator pushing a button to select a program. He also says:

The modification of program #1 so as to obtain program #2 could be patentable subject matter if it were carried out with a specific apparatus devised to implement this "modification". Such apparatus, however, have not been disclosed (or has been disclosed only as a black box labelled "COMPUTING CIRCUITS" (see Fig. 2).

The Examiner also rejects the other independent claims, 9, 11, 23, 30 and 36 on the same grounds as claim 1. In addition he rejects claims 9, 11, 23 and 36 by referring to the cited art.

In responding that his subject matter is patentable, Applicant argues (in part) as follows:

...

Applicant believes it is unquestionably clear that numerically controlled machines were known in the art prior to the present invention, and that operation of the machine by means of a program necessarily implies that the machine operator selected a program and installed it in the machine prior to initiation of the work operation governed by that program. Thus, selecting one program for a number of other programs that the machine could also use was an inherent step that a machine operator must have executed in order to place the machine in operation.

There is, however, a significant difference between that selection process of the prior art and the selection steps which constitute a part of the present invention. The machine with the present invention includes a primary program and one or more optional programs that are all loaded into the machine, and the optional programs when selected cause the output of the primary program to be modified if and when the optional programs are selected. ...The machine with the selective capability offers far greater flexibility in utilization of the machine.

...

Human intervention occurs in many machine processes such as mixing, cutting and others, and does not take those processes out of the field of patentable subject matter. It is only a purely mental step not associated either expressly or impliedly with machines or physical matter that is objectionable. Certainly the word "activating" is directed to a machine operation, particularly when it is accomplished "by means of a selector on the cutting machine". ...

...

...the mere fact that a computer program is utilized to cause a machine to perform a specific function does not render the machine unpatentable. Such a broad proposition would render unpatentable all machines that function in response to cams, stored electrical charges and other such equipment that is also considered to be "programmed". ...

...

Applicant says that the disclosure is sufficient and states (in part) as follows:

In contrast to the Examiner's statements that no apparatus has been disclosed to carry out the "selecting" or "supplementing" functions other than the panel 72, Figs. 4a and 4b discloses in a flow chart the steps followed in the θ -command channel (blade orientation). The corresponding description begins on page 14, line 23. Blocks 62 and 64 represent the steps performed by the primary program in determining tangential blade orientation at each point along a cutting path. Thus, the output of block 84 would be a blade orientation signal that positions the cutting blade tangentially to the cutting path in conventional fashion.

The remaining portions of Figs. 4 and 4b detail various optional yaw programs and the manner in which they operate upon the output of block 84 to produce a blade orientation signal that rotates or "yaws" the cutting blade out of its tangential position to accommodate various difficult cutting conditions as explained above with reference to the Pearl Patent 3,855,887. It is important to note that each of the interrogation gates 86, 110, 130, 140 and 190 corresponds respectively, and is in

fact actuated by one of the selector switches 88, 112, 132, 142 and 192 on the selector panel 72. Thus, by means of these switches, the optional program associated with a particular interrogation gate is rendered operative to modify the blade orientation signal at block 84 and generate a resulting blade rotation signal including a yaw component for transmission to the cutting table 22.

...

...In apparatus form, the invention is the selector panel 72 and the connecting hardware which performs the operation illustrated in the flow diagram of Figs 4a and 4b.

...

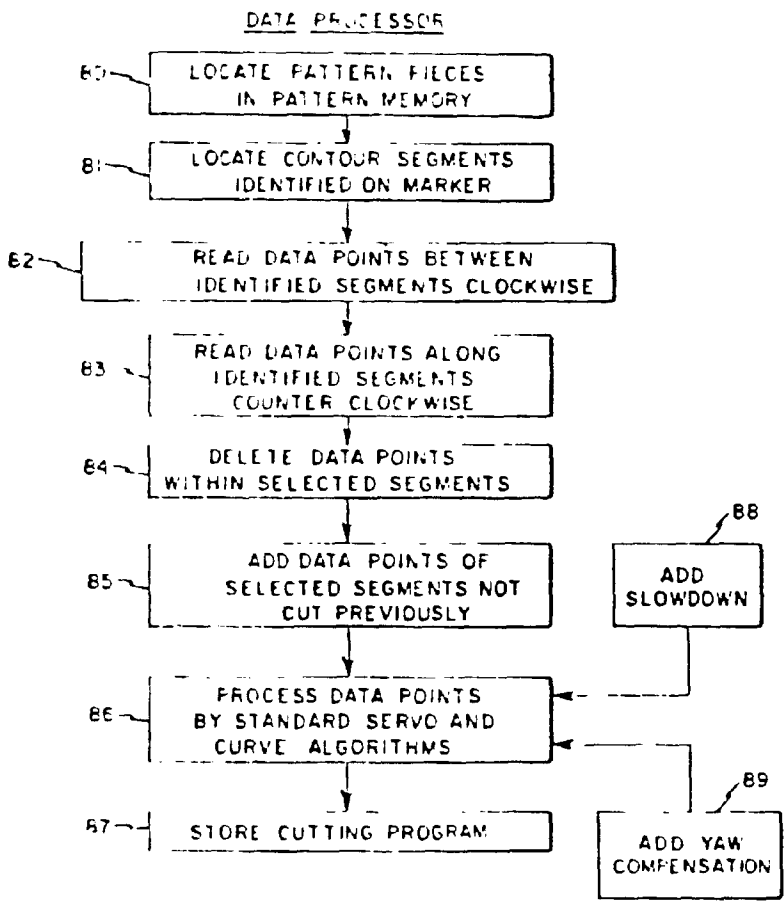
...The computer industry has adopted the flow chart as a fast, accurate and more meaningful method of communicating technical information to those skilled in the art, and the same practice has been adopted by Applicant in disclosure of his program-implemented design. For persons skilled in the art, Applicant has clearly met his disclosure obligations by making the invention known in a manner that will permit the invention to be used upon expiration of his patent.

...

In the Final Action the Examiner further rejects the application for being obvious in view of the following United States patents, both issued to this Applicant.

3,885,887	Dec. 24, 1974	Pearl et al
3,848,490	Nov. 19, 1974	Arel

The Pearl et al patent discloses an arrangement for cutting pattern pieces in sheet material, in which a cutting blade is advanced in the material, and also turned as it advances at selected points by means of appropriate sub-routines within a data processor. Figure 6 of that patent shows the programming operation, and is reproduced below.



The Arel patent also discloses an arrangement for cutting sheet material, in which a cutting blade is both advanced and rotated at certain points. Figure 5 illustrated below, shows that arrangement.

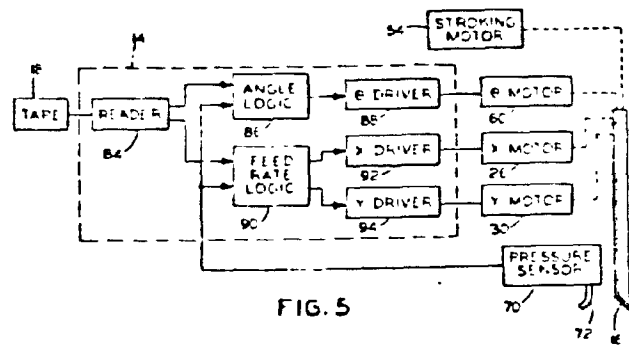


FIG. 5

On obviousness the Examiner says (in part) as follows:

...

PEARL et al reference discloses a numerically-controlled fabric sheet cutting machine wherein the control program is modified, or supplemented, by a "yaw compensation" program. (See Figure 6 item 89). PEARL et al also discloses several different programs or program-structures or sub-programs for this machine. (See Figures 7 and 8).

AREL reference discloses a numerically-controlled fabric sheet cutting machine. It discloses the logic circuitries (85 and 90 of Fig. 5) for positioning the cutter (16). It also discloses a pressure sensor (70) associated with the cutter which feeds back into the positioning logic circuitry (86 and 90).

Processing the predetermined information...(lines 22-24)

refers to the step of using a prior art computer to process information to provide known control signals to a known fabric cutting machine. This describes the functioning of PEARL et al and AREL machines.

Processing the predetermined information..."lines 26-28)

refers to the fact that when the operator pushed the first button mentioned hereinabove, program #1 (called "primary program") was activated; now the operator pushes a second button, thereby activating program #2.

...

Claims 28 and 29 add a "transducer associated with the cutting blade for measuring forces...". Such a transducer has been disclosed by the AREL reference (see Fig. 5 item 70).

...

Concerning the rejection based on obviousness, the Applicant argues (in part) as follows:

...

With the present invention, a single tape defines the contours of the patterns, and one copy of each permanently stored primary program and optional program may be used with all of the tapes to achieve a similar result. The flexibility offered by the cutting machine to call up the stored programs when a layup of cloth is on the cutting table at the beginning or in the middle of a cutting operation is also a significant advantage and improvement over the prior art.

The transducer referred to in claims 28 and 29 is a force-measuring transducer unlike the transducer disclosed in the Arel patent. The Arel transducer is a vacuum switch that measures low pressure regions at the surface of a layup, and such a sensor is quite distinguishable from a force transducer. The force transducer operates with the cutting blade to measure lateral forces applied to the blade and provides a directional signal proportional to the applied forces. The vacuum sensor simply cannot provide such information and merely indicates that there is a hole or other aperture through the cloth being cut. Additionally, the vacuum sensor in contrast to the force sensor would be of no utility whatsoever in cutting sheet material that is held in place without the aid of vacuum.

...

Claim 39 is dependent on claim 9, not claim 36, and defines a combination in which the computing means analyzes the data for critical cutting conditions and operates the selecting means automatically to engage an optional program. This embodiment of the invention adds a further function to the control computer which now selects the data points at which the supplemental programs are employed. The system is a more automated embodiment of the invention in which the selected program is based upon analysis of the cutting data in the pattern tape.

...

...It is undoubtedly clear that persons dealing with automatically controlled cutting machines such as shown in Pearl and Arel would have computer programming personnel available to translate the flow chart into an operative system employing combinations of hardware and software or firmware to achieve the desired result. The important matter insofar as the invention is concerned is the overall operation of the machine that is provided with the selective optional program capability. The hardware and associated software that provide that capability are disclosed in sufficient detail to enable the skilled artisan to reduce the invention to an operable embodiment....

...

...Formulas and mathematical expressions generally fall into (the) class of unpatentable subject matter. However, the present invention is not concerned with software nor any program that defines a mathematical expression or formula. The program in the disclosed embodiment of the invention is merely one element of a control in the cutting machine. The control includes other components, for example, the panel in Fig. 3, the optional program memory 70 in Fig. 2 and computing circuits that are controlled by the programs illustrated in Figs. 4a and 4b. All the hardware components are just as essential to the overall combination as the program and are unique in combination....

Subsequent to his response to the Final Action, the Applicant withdrew his request for an oral Hearing.

The issues before the Board are whether or not the disclosure is sufficient, the application is directed to patentable subject matter, and the subject matter is obvious in view of the cited art. Claim 1 reads:

A method of cutting sheet material with an automatically controlled cutting machine having a cutting tool advanced along a cutting path during relative movements of the sheet material and cutting tool and in accordance with predetermined information defining the cutting path comprising:
reducing the predetermined information to a machine readable form;
establishing a primary program for processing the reduced predetermined information and generating fundamental commands for advancing the sheet material and the cutting tool relative to one another along the cutting path in accordance with the predetermined information;
establishing an optional program for processing the reduced predetermined information in conjunction with the primary program and generating supplemental machine commands;
storing the primary and optional programs in a program memory;
activating the primary program stored in the memory;
selectively activating or not activating the optional program stored in the memory by means of a selector on the cutting machine;
processing the predetermined information with the primary program and generating fundamental machine commands when the optional program has not been selected at the cutting machine;
processing the predetermined information with the primary and the optional program and generating supplemental and fundamental machine commands when the optional program has been selected at the cutting machine; and
controlling the relative movement of the sheet material and the cutting tool with the machine commands generated.

The Board will consider each of the examiners reasons for rejection in the light of the statements of Pratte J. in Schlumberger Canada Ltd. v The Commissioner of Patents 56 CPR (2d) at 204 (1981). The decision being handed down in 1981 was not, of course, available to assist the examiner when he wrote the Final Action on this case. In that decision involving computer-related subject matter, Pratte J. had these comments :

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.

and

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.

We consider first the rejection of the application for insufficiency of disclosure. We learn from pages 27, 28, 28b and 28c of the application that the selection of an optional program to work in conjunction with the cutting program may be performed automatically by the computer. We note that the selector switches 88, 112, 132, 142 and 192 are intended to operate the interrogation gates 86, 110, 130, 140 and 190 respectively. We are informed by Applicant that the kind of representation of the interrogation gates is conventional, and that it is not felt that the detail of switch structure to actuate such a gate is necessary to establish invention. We also note that manual operation of the optional program is stated to be within the purview of the disclosure. We learn further from the description of figure 17 that there is a combination of components including sensors associated with the line follower and cutting blade to send signals of actual operation to the various coordinate programmers which in turn actuate mechanism to alter the rate, and orientation of the blade to meet actual conditions of operation. We see no evidence that the disclosure is insufficient, and we are satisfied that the rejection of insufficiency of disclosure is not proper.

We consider next, the subject matter of the application. We learn from the disclosure that it relates to a method and apparatus for cutting pattern pieces from sheet material, and that a combination of different programs is used. As is generally known, programs may be devised by programmers. We note though that the programs per se have not been stated to be the invention. The disclosure describes a cutting machine and blade apparatus and arrangement operated by motive means from signals relayed via a computer circuitry which integrates signals from a cutting program with those of actual conditions to permit

selective manoeuvring of the blade at any time during the cutting. We note that the cited art has an arrangement of parts only for automatic operation of one program and does not disclose any arrangement or any contemplation of providing two programs which may be used together to obtain selectivity of operation. We are persuaded that Applicant's end result is not merely a resolution of an algorithm by a program, and as guided by Schlumberger supra, is instead an attainment of the "what... has been discovered." namely, selective blade orientation at any time during the cutting operation to achieve an improved cutting result over and above the programmed changes in blade orientation. We do not agree therefore with the Examiner's refusal of the entire application, as we find it contains patentable subject matter.

Having found that the disclosure is sufficient and that there is patentable subject matter in the application, we now turn to the rejection that the method claims are directed to mental steps performed by a machine operator (or computer programmer). In reviewing claim 1, we find the procedural steps are concerned entirely with the provision and selection of programs; no operating procedure is given other than selecting or not selecting the optional program and even in this step the basis for selecting or not selecting is not set out. This kind of selection, in our opinion, depends on the knowledge and judgement of the operator and although Applicant says claim 1 is a method claim, we find that the crucial decision in the method is left to the knowledge and experience of the operator. We note that the examiner raised the objection to the method claims from the point of view that the only significant steps he could find were the selections of the programs. We agree with the examiner's position in his analysis of this point but we do not view and consider the selection step in isolation from the remainder of what is claimed. Considering claim 1 as a whole therefore, the only parts not concerned with providing and selecting programs are the preamble which reads:

A method of cutting sheet material with an automatically controlled cutting machine having a cutting tool advanced along a cutting path during relative movements of the sheet material and cutting tool and in accordance with predetermined information defining the cutting path....

and the concluding lines which are:

controlling the relative movement of the sheet material and the cutting tool with the machine commands generated.

In our view, these passages are merely conventional statements of the purpose of the device, and we do not think they add anything of a substantial procedural step to claim 1. We are persuaded that, when read with the remainder of the claim, they do not impart patentability to what we consider to be a non-patentable method claim.

In claim 11 the method includes the step of combining stored yaw signals with calculated rotation signals to produce modified blade rotation signals. In our view such a step is derived merely from programs and adds no feature which may be considered patentably different from the step of claim 1. We recall the Examiner's comments to the effect that there might be patentable subject matter where specific apparatus is disclosed to implement the modification referred to in the disclosure. We are mindful also of Applicant's arguments that the transducer associated with the cutting blade for measuring forces, as found in claims 28 and 29, has not been disclosed by the cited patents, and we note the patents do not show any means to obtain signals from both the cutting blade and the line follower in a programmed operation. We are persuaded therefore, that Applicant's apparatus for the interconnection of signals from these elements to the feedrate and yaw programmers achieves his useful results. We observe that claim 21 as dependent on claim 11, introduces additional steps causing changes to be made to the blade orientation by measuring actual blade forces and developing feedback signals representing the measured forces, and then using the developed signals to activate and modify a stored program. We find that the additional steps in claim 21 are not pre-defined but are derived as a result of actual conditions and achieve

improved cutting results during actual operation. We are persuaded therefore that the steps defined in claim 21 are directed to more than the selection or operation of a computer program by a machine operator.


We now consider the apparatus claims with reference to the cited patents. In this application the cutting table and the tool are similar to those in the cited patents, as is the cutting program which provides instructions for the cutting path the tool follows, and for manoeuvring it about an axis as it follows a path. From these patents, and others referred to in this application as examples of known components and how programs are used in controlling a working component, we observe that it is sufficiently established that automatic operation by different programs in a computer controlled cutting machine is known. We find some claims, like 9, 23 and 36, do not clearly define apparatus to obtain selective manoeuvring of a blade to meet actual operating conditions. We find that these claims only recite that primary and optional programs control the relative movement of the material and the tool, as disclosed by the cited art. Applicant says that in claim 28 as dependent on claim 23, and claim 29 as dependent on claim 28, the transducer operates with the cutting blade to measure lateral forces thereon and provide signals proportional to these forces. We find that claims like 28 and 29 pertain to an automatically controlled machine in which a combination of components are responsive to feedback signals from a cutting blade to provide modified blade rotation signals during actual operation. We are persuaded that some claims, like 28 and 29, are directed to more than a computer program, in view of the cited art which does not disclose such a combination. We are satisfied therefore that claims like 28 and 29 overcome the rejection in the Final Action.

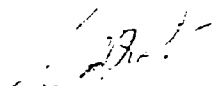
In reviewing the application to determine what is disclosed as the invention, we note that there are references to several patents to illustrate the kind of components which are known and available for use in practicing the invention. On pages 20 and 21 respectively, reference is made to United States patents 4,140,037 and 4,133,235, which we observe correspond to Canadian

patents 1,089,557 and 1,085,029, respectively. Each of these Canadian patents is generally directed to the attainment of blade control by means of certain apparatus which senses lateral forces on a blade during operation and produces signals to control blade orientation during actual operation. While not an issue in the Examiner's Final Action, it may be that claims 21, 28 and 29, do not distinguish patentably over the above Canadian patents to Applicant.


In summary, we are satisfied that the disclosure is sufficient, and that the application is directed to patentable subject matter. We are satisfied, also that claims 21, 28 and 29, are directed to patentable subject matter in view of the cited art, and that claims 1 to 20, 22 to 27, and 30 to 39 are not so directed. We have noted that Applicant's Canadian patents 1,089,557 and 1,085,029 form no part of the rejection under consideration, and we make no ruling on their relevancy to the subject matter of this application.

We recommend withdrawal of the rejection of the application for insufficiency of disclosure, and for being directed to non-patentable subject matter and for being obvious in view of the cited art. We recommend further that the rejection of claims 21, 28 and 29, for being obvious in view of the cited art, be withdrawn, and the the rejection of claims 1 to 20, 22 to 27 and 30 to 39, be maintained.


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 rejection of the application for insufficiency of disclosure, for being directed to non-patentable subject matter, and for being obvious in view of the cited art, and I also withdraw the rejection of claims 21, 28 and 29 for being obvious. I refuse however to grant a patent containing claims 1 to 20, 22 to 27, and 30 to 39. The applicant has six months within which to appeal my decision under the authority of Section 44 of the Patent Act.


J.H.A. Gariépy
Commissioner of Patents

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Dated at Hull, Quebec
this 17th day of January, 1984