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BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

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File Number: T 955/90 - 3.4.1

Application No.: 87 100 801.7

Publication No.: 0 235 534

Title of invention: Impact detection apparatus

Classification: G01P 1/16

D E C I S I O N
of 21 November 1991

Applicant: BOARD OF TRUSTEES OPERATING MICHIGAN STATE UNIVERSITY

Headword:

EPC Article 56

Keyword: "Inventive step (No)" - Person skilled in broader general field consults narrower field of main application of a general technology, which field is known to a general public (para. 1.3)"

Headnote

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number : T 955/90 - 3.4.1

D E C I S I O N
of the Technical Board of Appeal 3.4.1
of 21 November 1991

Appellant : BOARD OF TRUSTEES OPERATING MICHIGAN STATE UNIVERSITY
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Decision under appeal : **Decision of Examining Division 036 of the European Patent Office dated 20 August 1990 refusing European patent application No. 87 100 801.7 pursuant to Article 97(1) EPC.**

Composition of the Board :

Chairman : G.D. Paterson
Members : H.J. Reich
Y. van Henden

Summary of Facts and Submissions

I. European patent application No. 87 100 801.7 was refused by a decision of the Examining Division.

II. The reason given for the refusal was that all the features and steps of Claim 1 as filed on 3 April 1990 were known from document

D1: WO 84/03359

and that independent Claim 2 as filed on 3 April 1990 did not involve an inventive step in the light of this prior art and known standard possibilities in electronical means, from which a skilled person would select according to the circumstances without the use of inventive skill.

III. The Appellant lodged an appeal against the decision, in particular based on the argument that in the method and apparatus known from document D1 data are continuously recorded and at an accident (crash) the cyclic overwriting of previously stored data is stopped, whereas according to the subject-matter of Claims 1 and 2 the data are only recorded during an interval of time beginning when one of the signals exceeds a predetermined level and ending when none of the signals exceeds said predetermined level.

IV. In a communication preparing oral proceedings the Board accepted the Appellant's above argument, but drew his attention to the fact that the above-mentioned features of Claims 1 and 2, i.e. data-recording only within an interval of time during which the acceleration stays above a predetermined critical value, although admittedly not known from document D1, was in fact known from document:

D3: US-A-4 387 587.

Furthermore, the Board informed the Appellant of its provisional view, that the method according to Claim 1 might be regarded as an obvious analogous use of the selective activation of the storing means as known from document D3 in the method disclosed in document D1. Apparatus Claim 2 might be held as the non-inventive result of the simultaneous application of a skilled person's general knowledge and the teachings of documents D3 and

D2: Transaction of the American Society of Agricultural Engineers, Vol. 16, 1973, pages 245-247

in the detector/recorder known from document D1.

V. In response to this communication, the Appellant filed on 15 October 1991 new Claims 1 and 2, which in addition to their former subject-matter comprised the features of "setting and resetting a flag" or "flag means" respectively.

Claims 1 and 2 read as follows:

"1. Method for detecting force or acceleration events experienced by a housing containing force or acceleration detecting transducer means, clock means, memory means, communication means, micro processor means and power supply means, comprising (spelling mistake corrected) the following steps:

Sensing acceleration in three orthogonal directions and producing analogue signals corresponding to the acceleration in each of the three directions;

converting the analogue signals produced by each of the three acceleration means into digital signals;

processing said three digital signals;

producing a digital signal representing time;

storing data representing the processed digital signals and the digital time signals; and

reading the program instructions for controlling the storage of data and the reading of the stored data for communicating said data to an external device;

characterised in that

setting a flag when at least one of the accelerations satisfies a predetermined criterium, corresponding to a great shock experienced by said housing and resetting said flag when none of the accelerations satisfies said predetermined criterium in order to define an interval of time, and,

storing the data representing both the digital signals produced by the acceleration means and the digital time signals only during said interval of time;

whereby the stored acceleration time histories including time, frequency and location of severe force or acceleration events, experienced by a fragile equipment including the housing during shipment of same, can be read-out to the external device after the equipment comes to a final rest.

2. An acceleration event detector/recorder, comprising:

A housing (10);

three acceleration means (22) disposed within the housing (10) for sensing accelerations in three orthogonal directions (XYZ) and producing analogue signals corresponding to the accelerations in each of the three directions;

analogue-to-digital converter means (70) within the housing (10) for producing digital signals representing the analogue signals produced by each of the three acceleration means (22);

arithmetic logic means (68) within the housing (10) and adapted to receive, from the analogue-to-digital converter means (70), the three digital signals quantifying the acceleration along each of the three orthogonal axes for processing the digital signals;

clock means (88) within the housing (10) for producing a digital signal representing time;

read-only memory means (16) within the housing (10) for storing program instructions;

digital memory means (18) within the housing (10) adapted to receive digital signals from the arithmetic logic means (68) and the clock-means (88) for storing data representing the digital signals;

a battery (20) adapted to provide electrical power to the detector/recorder, and

microprocessor means (14), connected to communication means, the analogue-to-digital converter (70), the arithmetic logic means (68), the clock means (88), the read-only memory means (16) and the digital memory means (18), and adapted to read the program

instructions from the read-only means (16), for controlling the storage of data and the reading of the stored data in the digital memory means (18), and for communicating the data stored in the digital memory means (18) with the external device;

characterised in that

said housing (10) is constructed to approximate or to be fixedly attached to a fragile equipment or a fruit, in size, shape, and mass and whose acceleration events can be correlated to those experienced by the equipment or fruit during shipment of same;

said microprocessor means (14) is adapted to read and execute the program instructions from the read-only memory means (16), for causing the data representing both the digital signals produced by the acceleration means (22) during an interval of time and the digital timer signal produced by the clock means (88) at the beginning of the interval of time to be stored in the digital memory means (18), for setting flag means (95) when at least one of the accelerations satisfies a predetermined criterium corresponding to a great shock experienced by said housing and for resetting said flag means (95) when none of the accelerations satisfies said predetermined criterium, whereby said interval of time is defined.

Claims 3 to 14 as filed on 29 November 1990 are dependent on Claim 2.

VI. Oral proceedings were held on 21 November 1991, at the end of which the Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of Claims 1 and 2 filed on 15 October 1991 in combination with Claims 3 to 14 previously on file.

VII. In support of his request the Appellant argued essentially as follows:

(a) The technical problem underlying the present application is to record during the shipment of small articles a plurality of acceleration events which occur on the way from a plant to a customer, for example, which events are likely to cause damage to the shipped articles. The recording is to be carried out by apparatus contained within a housing of similar size to the articles, which accompanies the articles during shipment, but which therefore has space only for a memory of limited capacity. After shipment the recorded data are read out in order to control the usability of the shipped articles.

This problem is different from the one underlying the prior art device described in document D1. This device records only one event, i.e. the crash of a vehicle, the size of which does moreover not lead to space problems in the memory.

(b) The above problem is solved by monitoring the events, deciding on their storage, setting a flag and storing their data. Such a solution cannot be found in the cited prior art.

(c) Dealing with small-sized articles, document D2 has to be regarded as the nearest prior art. In document D2 the above problem is solved by a permanent telemetering of the output of a shock sensor. Telemetry would give a skilled person no hint to the claimed selective data recording.

(d) The apparatus of document D3 is used in a skid-test of a vehicle and stores a great number of data. The selection principle of document D3 has the object to

sort out data of interest but not to save memory space. There is no space problem for a detector/recorder housing in a vehicle.

(e) The flag means and their setting and resetting have been introduced into the independent claims in order to express more clearly the principle of the present application and its inventiveness.

VIII. At the conclusion of the oral proceedings the decision was announced that the appeal was dismissed.

Reasons for the Decision

1. Inventive step - Claim 1

1.1 From document D1 there is known in the wording of Claim 1: a

"method for detecting force or acceleration events experienced by a housing containing force or acceleration detecting transducer means (see D1, 26 in Fig. 1), clock means (21a in Fig. 1), memory means (22), communication means (30), micro-processor means (21 and page 14, line 6) and power supply means (D1, page 13, line 23), comprising the following steps: sensing accelerations in three orthogonal directions and producing analogue signals corresponding to the acceleration in each of the three directions (Fig. 5 and page 22, line 17 to page 23, line 8) converting the analogue signals produced by each of the three acceleration means into digital signals (page 43, lines 15, 16); processing said three digital signals (page 20, lines 3 to 19 in combination with

page 43, line 28, to page 44, line 4); producing a digital signal representing time (page 13, lines 20, 21); storing data (page 23, line 9 to page 24, line 6) representing the processed digital signals (bl, bq, bw) and the digital time signals (SZ, TZ, EZ); and reading the program instructions for controlling the storage of data (implicit in Fig. 1) and the reading of the stored data for communicating said data to an external device (page 37, line 25 to 30); characterised in that storing the data representing both the digital signals produced by the acceleration means and the digital time signals only during an interval of time (page 28, lines 9 and 10)."

The method claimed in Claim 1 is distinguished from the prior art according to document D1 by the following measures:

(a) "setting a flag when at least one of the accelerations satisfies a predetermined criterium, corresponding to a great shock experienced by said housing and resetting said flag when none of the accelerations satisfies said predetermined criterium in order to define an interval of time"

(b) "storing the data ... only during said interval of time" (i.e. in which the flag is set).

In the Board's view, the last paragraph of Claim 1, i.e. the wording "whereby the stored acceleration time histories including time, frequency and location of severe force or acceleration events experienced by fragile equipment including the housing during shipment of the same, can be read out to the external device after the equipment comes to a final rest" defines a possible use which is the logical result of the claimed technical measures but does not further characterise them. Hence,

the last paragraph of Claim 1 does not add any subject-matter to the method claimed.

1.2 In the prior art according to document D1 the data storing is effectuated by one actuating signal, "which is set when one of the accelerations satisfies a predetermined criterium, corresponding to a great shock (crash)". This signal stops the cyclic rewriting of force and acceleration data into the memory after a predetermined time, so that the stored acceleration time history starts a predetermined time before the critical event and ends a predetermined time thereafter, corresponding to the practical interest in the use for vehicle crash.

In view of the established jurisprudence of the Boards of Appeal the nearest prior art is normally considered to be the most similar one in structure and its inherent effects, and which therefore gives the most promising starting point from which the invention could be made. It is evident that the method of document D1 comes nearer to the structural subject-matter of Claim 1 than that of document D2, which uses a telemeter system instead of a memory. Document D1 is also the nearest one with regard to the inherent effects produced by the measures in Claim 1, i.e. storing the time history of data which represent detected force or acceleration events. For these reasons the Board does not accept the Appellant's view according to paragraph VII(c) above that the nearest prior art is disclosed in document D2. Moreover, Claim 1 is not limited to a "small" housing, nor to any particular kind of use.

Starting from document D1, the objective problem underlying Claim 1 has to be seen in the technical aim to reorganise in the known method the interval of time in which force or acceleration events are stored, so that during a large monitoring interval only acceleration or

force events of interest are recorded and the memory storage requirements can thereby be reduced. In the Board's view, the definition of this problem arises out of practical needs and normal design considerations and does not contribute to inventive step.

1.3 In the Board's view, it corresponds to a real life assessment that a person skilled in a broader general field - such as that of detecting and recording force and acceleration events - consults the particular narrower technical field of the well known main application of this general technology - such as vehicles - in order to look for a solution of a problem which is independent of a particular use of this technology. Moreover, due to the publicity associated with air crashes, the use of tachographs in vehicles is well known to a general public and thus also -in view of paragraph VII(a) above - known to a person who is concerned with the shipping of fragile goods; see also decision T 560/89 (to be published). For the above reasons, the Board regards the relevant skilled person to be aware of the teaching of document D3, dealing according to the title of document D3 with "Motor Vehicle Deceleration Data Acquisition."

Contrary to the Appellant's view in paragraphs VII(b) and (d) above, the Board is convinced that the skilled person is able to recognise from the teaching of document D3, in particular column 5, lines 41-46, and also column 5, line 67 to column 6, line 10, that the objective problem underlying the present application can be solved by

(a') "setting" an actuating signal (D3, col. 5, lines 44, 45) "when at least one of the accelerations satisfies a predetermined criterium, corresponding to a great

shock experienced by said housing (containing the means for executing the method) and resetting the actuating signal" when none of the accelerations satisfies said predetermined criterium in order to define an interval of time", and

(b) "storing the data only during said interval of time".

The replacement of the "actuating signal" provided by the threshold detector 107 in Figure 5 of document D3 in measure (a') by a "flag" as claimed in distinguishing feature (a) has to be regarded as an obvious exchange of well known equivalents.

1.4 For the above reasons, the Board regards it as obvious to make use of the selective memory actuation known from document D3 in the method disclosed in document D1, and to carry it into effect by means of a well-known equivalent.

1.5 Therefore, in the Board's judgment Claim 1 lacks an inventive step and is not allowable having regard to Articles 52(1) and 56 EPC.

2. Inventive step - Claim 2

2.1 From document D1 there is known in the wording of Claim 2:

"An acceleration event detector/recorder, comprising: a housing, three accelerometer means disposed within the housing for sensing accelerations in three orthogonal directions and producing analogue signals corresponding to the accelerations in each of the three directions (see D1, Fig. 5 and page 22, line 17, to page 23, line 8) analogue-to-digital converter means within the housing for

producing digital signals representing the analogue signals produced by each of the three acceleration means (page 43, lines 15, 16); arithmetic logic means (21 in Fig. 1) within the housing and adapted to receive, from the analogue-to-digital converter means, the three digital signals quantifying the acceleration along each of the three orthogonal axes for processing digital signals (page 20, lines 3 to 19 in combination with page 43, line 28, to page 44, line 4); clock means within the housing for producing a digital signal representing time (21a in Fig. 1 and page 14, para. 1) digital memory means (22 in Fig. 1 and page 14, line 8) within the housing adapted to receive digital signals from the arithmetic logic means and the clock means for storing data representing the digital signals (page 23, line 9, to page 24, line 6); a battery adapted to provide electrical power to the detector/recorder (page 13, line 23), and microprocessor means (21 in Fig. 1, page 14, line 6) connected to the analogue-to-digital converter, the arithmetic logic means, the clock means and the digital memory means and adapted to read program instructions for controlling the storage of data in the digital memory means (follows from Fig. 1 and the corresponding description) characterised in that said microprocessor means is adapted to execute program instructions for causing the data representing both the digital signals produced by the acceleration means during an interval of time and the digital timer signal produced by the clock means (page 23; line 9, to page 24, line 6; and page 28, lines 9 and 10) at the beginning of the interval of time (page 27, line 21) to be stored in the digital memory."

The subject-matter of Claim 2 is distinguished from the detector/recorder of document D1 in that:

(a) said microprocessor means is adapted "for setting flag means when at least one of the accelerations satisfies a predetermined criterium corresponding to a great shock experienced by said housing and for resetting said flag means when none of the accelerations satisfies said predetermined criterium, whereby said interval of time (for storing data in the digital memory means) is defined";

(b) the microprocessor means is additionally "connected to communication means and to read-only memory means within the housing for storing program data" and adapted to read the program instructions "from the read-only memory" additionally for "the reading of the stored data in the digital memory means and for communicating the data stored in the digital memory means with the external device"; and

(c) "said housing is constructed to approximate or to be fixedly attached to fragile equipment or a fruit in size, shape and mass and whose acceleration events can be correlated to those experienced by the equipment or fruit during shipment of the same".

2.2 Each of the individual distinguishing features (a), (b) and (c) defined above in paragraph 2.1 contributes to the working functions of the detector/recorder of document D1 only its own effects. The assessment of inventive step in the subject-matter of Claim 1, therefore, splits into three independent enquiries, each concerning an individual distinguishing feature:

2.3 The detailed reasons why it is considered obvious to solve the storage-capacity problem by distinguishing feature (a) are indicated in paragraphs 1.1 to 1.3 above.

2.4 Storing program-data in a read-only memory as claimed according to a part of distinguishing feature (b) is disclosed in document D3, see D3, ROM 113 in Figure 5 and column 6, lines 17-21. The remaining part of distinguishing feature (b) concerns the functional integration of "communication means" and an "external device" into the microprocessor means of document D1. In the Board's view the additional installation of "an external device" having no specified functions, lies within the routine discretion of a skilled person. The provision of "communication means for communicating data to this external device is a mere logical consequence. Moreover, in order to integrate a "ROM", a "communication means" and an "external device" according to distinguishing feature (b) into the circuit of document D1, a skilled person needs to use only generally known circuit means. Hence, the use of the means defined in distinguishing feature (b) in the detector/recorder disclosed in document D1 is regarded as falling within the normal range of capability which is expected from a skilled person.

2.5 The subject-matter of distinguishing feature (c) concerns design conditions of a housing for a force or acceleration event detector, which are known from document D2 to be necessary for an optimum result in monitoring undesired shocks during the transport of fragile goods; see D2 in particular page 245, right column, lines 2 to 7. A skilled person recognises easily that these conditions are based on the necessities of an optimum momentum (impulse) transfer, and that - for this reason - the teaching of document D2 is independent from the fact that the known housing additionally comprises a telemeter system. Thus, the application of the housing design conditions of document D2 in the detector/recorder disclosed in

document D1 represents a use of a known technology in a closely analogous situation, which use is regarded not to imply an inventive step.

2.6 For the above reasons the Board regards it as obvious to simultaneously use the selective memory activation and read-only means of document D3, a generally known "external device" with its "communication means" and the housing design conditions of document D2 in the detector/recorder disclosed in document D1 and to arrive thus at the subject-matter of Claim 2.

2.7 Therefore, in the Board's judgment Claim 2 also lacks an inventive step and is not allowable having regard to Articles 52(1) and 56 EPC.

3. Claims 3 to 14 fall because of their dependence on Claim 2.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar: **The Chairman:**

M. Beer **G.D. Paterson**