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D E C I S I O N
of 30 November 2000

Case Number: T 0343/99 - 3.4.2

Application Number: 91302931.0

Publication Number: 0450938

IPC: H01M 10/48, G01R 31/36

Language of the proceedings: EN

Title of invention:
Battery having a label comprising a voltmeter

Patentee:
EASTMAN KODAK COMPANY

Opponent:
Eveready Battery Company

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (yes)"
"Document admitted in oral proceedings (not complex)"

Decisions cited:
T 0116/90, T 0633/97

Catchword:
-



Case Number: T 0343/99 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 30 November 2000

Appellant: Eveready Battery Company
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Respondent: EASTMAN KODAK COMPANY
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 2 February 1999
rejecting the opposition filed against European
patent No. 0 450 938 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: E. Turrini
Members: M. A. Rayner
B. J. Schachenmann

Summary of Facts and Submissions

I. The appellant (opponent) has appealed against the decision of the opposition division rejecting the opposition against European patent No. 450 938 (application No. 91 302 931.0). Reference was made during the opposition to, *inter alia*, the following documents:

D1: US-A-1 497 388

D2: "Solid State RMS Recording Ammeter", R Parker, IEEE Transactions on Power Apparatus and Systems, vol. PAS-92, no. 1 (1973), pages 104 to 107

D3: US-A-4 737 020

D4: US-A-4 723 656

D5: "Polymer Thick Film Conductors and Dielectrics for Membrane Switches and Flexible Circuitry", N Nazarenko et al., The International Journal for Hybrid Microelectronics, vol. 5, no. 2 (1982), pages 363 to 372.

D6: Declaration by Mr Russell, filed by the appellants with the letter of 12 November 1998.

In the appeal proceedings (see VI below) reference was made also to the following document mentioned in the introduction of the patent and cited during examination proceedings:

D9: US-A-4 379 816

In the decision under appeal, the opposition division considered it not to be obvious that by combining the teachings of documents D1 and any of D2 to D4 a skilled person would arrive at a switch cooperating with a conductive housing as claimed. According to point 9 of the reasons of the decision under appeal, following a reference to document D6 mentioning alternative methods for making a switch, there is a recitation that the patent in issue (column 5, line 51 to column 6, line 4) mentions switching means with an external tab to be connected directly or indirectly through an external conductor to a battery terminal.

II. The appellant requested setting aside of the decision of the opposition division and revocation of the patent in its entirety. The respondent (patent proprietor) requested the board to dismiss the appeal of the appellant. The board understood both parties to request oral proceedings on an auxiliary basis.

III. According to the appellant, document D1 represents the closest prior art to the subject matter of claim 1. It is obvious to replace the indicator of document D1 with the teaching relating to the tester of document D3. The contacting arrangement of document D3 is a switch, which moreover is formed by means of apertures cooperating with an electrically conductive surface of the battery. All of the physical features of construction and operation required by claim 1 of the patent are present in document D3. Therefore a combination of the teachings of documents D1 and D3 renders the subject matter of claim 1 of the patent in issue obvious.

IV. According to the respondent, the decision of the

opposition division fails to consider the contribution to inventive step provided by the structures related to thermal insulation means in relation of a heat sensitive device and countering heat sinking by the housing. In respect of the switch, claim 1 refers to an electrically conductive surface of the battery housing and not to a conducting surface of the battery as referred to by the appellant in the proposed combination of documents D1 and D3. This combination would provide contact only on the battery electrodes, which hinders using the battery.

V. Oral proceedings were appointed consequent to the auxiliary requests of the parties. In an annex to the summons the board informed the parties that it was intended, if possible, to resolve all outstanding issues so that a decision could be taken at the end of the oral proceedings. The board commented that if the skilled person attempted to solve the general problem of providing a state-of-the-art voltmeter by moving away from the moistened indicator impregnated in carrier 5 according to document D1 and should the teaching of document D3 be followed in this attempt, a simple possibility would have been to dispense entirely with the impregnated carrier 5 and use the "thermal" teaching of document D3 "as is" according to, for example, Figure 3 thereof. Moreover, it seemed to be common both to documents D1 and D3 that connection is made to the terminals of the battery. It seemed questionable whether such connection renders cooperation of the switch means with an electrically conductive surface of the battery housing obvious.

VI. During the oral proceedings, the appellant explained that in the teaching of document D1, the zinc can is in

contact with the cathode mix and thus the zinc can and the battery end constitute the terminal. The appellant submitted that document D1 showed that even at the time of that document it was possible to have a voltmeter as part of a battery. The skilled person seeing document D3 would have thought, wouldn't it be a good idea to incorporate this tester into a battery label, and thus reached the claimed invention. There is no reason not to pull the tester back onto the jacket of a battery like that disclosed in the pages 28 and 29 annexed to document D6. Responsive to the emphasis laid by the respondent on insulation, the appellant referred to document D9, which was mentioned in the introduction of the patent specification and argued that an insulation was known therefrom. Therefore no inventive step was provided by this feature. The battery according to D9 would, of course, have to fit standard sizes and would thus not show a bulge.

The respondent pointed out it was accepted that, in practice, the can according to document D1 has a jacket and filed Exhibit 27a to illustrate this. Document D9 should, according to case law of the boards of appeal, not be admitted into the proceedings at this late stage as it was not relevant (see for example decision T 0116/90).

VII. Claim 1 is worded as follows:

A battery having a label attached thereto, the battery comprising a housing (4) which acts [as] a heat sink, characterized in that the label includes, as an integral part thereof, a voltmeter (1) comprising:

a dielectric layer (13);

a conductive layer (14,15,16) adjacent one of the surfaces of the dielectric layer (13); and

a temperature sensitive color indicator layer (19) in thermal contact with the conductive layer (14,15,16), the conductive layer (14,15,16) having sufficient heat generating capacity to effect a change in the temperature sensitive color indicator layer (19);

and in that the voltmeter further comprises thermal insulating means (11,12) on the other surface of the dielectric layer (13) for thermally insulating the conductive layer (14,15,16) and the dielectric layer (13) from the housing of the battery (4) to which the label is attached, and one or two apertures (20) in the dielectric layer (13) for forming an electrical switch cooperating with an electrically conductive surface of the battery housing (4), one or both ends (15,16) of the conductive layer (14) being in registration with a corresponding aperture (20) thereby forming said switch.

VIII. At the end of the oral proceedings, the board gave its decision.

Reasons for the Decision

1. The appeal complies with the provisions mentioned in Rule 65(1) EPC and is therefore admissible.
2. *Article 114(2) - Document D9*
 - 2.1 The appellant ran the risk of document D9 not being admitted into the proceedings, because despite being

aware of the line of argument of the respondent well in advance of the oral proceedings, reference was made to the document only during the proceedings. The board nevertheless admitted document D9 into the proceedings because the document can be readily understood (the figures for example have only between three and nine reference numerals) so that complexity of the technical issues is not such that the other party or the board could not have been expected to deal with the document without adjournment of the oral proceedings (see point 2 of the headnote of decision T 0633/97). In fact, the parties and the board were able to, and did, deal with the document within the existing timeframe for the oral proceedings as set out in the annex to the summons.

- 2.2 The criterion of relevance of document D9, as argued by the respondent, would not seem to offer a convincing approach in the present case, because in application of this criterion the document would in practice have had to be looked at, and arguments heard, in advance of any conclusion as to relevance being reached.

3. *Amendments*

Since the patent, including the granted claims, has not been amended, no question in relation to Article 123(3) EPC arises. With respect Article 123(2) EPC, admissibility of amendments made during examination proceedings, including adaptation of the introduction of the specification to the claims, have not been part of the opposition or appeal proceedings.

4. *Novelty*

- 4.1 Document D1 relates to indicating the electrical condition of a cell. A preferred indicator is phenolphthalein carried by a carrier such as an absorbent paper (5 in the Figures), such that when moistened, differing colour is shown dependent on current strength through the spot moistened. Spaced apart wires (9,10 in the Figure 1) from respective cell terminals to which attachment can be made with clips or sheet metal (23,24 in the Figure 3) penetrating into the electrolyte bring current to the moistened spot. A colour chart (15 or 28,29) for interpreting the colour is printed on the paper carrier. The indicator is attached to, or sent along with, each single cell so that the strength of the cell may be readily tested. There is some doubt about whether the embodiment of Figure 3 works in practice, since the sheet metal components would seem to be susceptible to shorting in the electrolyte.
- 4.2 While the absorbent paper has the indicating material integrated therein, there is no recitation that it also contains information about the battery which means that it can be just an attachable, if desired, indicator so that interpreting it as a voltmeter integrated in a label requires information not present in the document. The impregnated paper with wires or sheet metal does not moreover constitute the dielectric, conductive and temperature sensitive layers as defined in claim 1 of the patent in issue, nor is any heat sinking function of the battery housing explicit. Moreover, the particular structure of membrane switch claimed is not disclosed by connecting to the terminals of or via the sheet metal penetrations into the cell as disclosed in document D1. Accordingly, the subject matter of claim 1 of the patent is novel over the disclosure of document

D1.

4.3 Document D2 relates to an ammeter with a liquid crystal coated, blackened stainless steel foil mounted in a plastic case with a glass window (see Figure 1). There is no disclosure of a battery, label or particular structure of switch as claimed in the patent. Accordingly, the subject matter of claim 1 of the patent is novel over the disclosure of document D2.

4.4 Document D3 relates to a battery tester in the form of a flexible film substrate (Figure 5, 41) with a patterned layer of conducting material (Figure 5, 42 or 44) and a liquid crystal layer (Figure 5, 50) on the other side. When a current passes through the conductive material pattern a temperature gradient is generated. Heat transferred to the liquid crystal pattern through the substrate causes the former to change colour to an extent dependent on voltage output of a cell to which the tester is applied. The application to the cell is effected simply by bringing appropriately located conductor contacts through holes (Figure 5, 59) in a cover film into contact with the cell terminals. The battery tester is not integrated into a label as required by claim 1 of the patent in issue and does not cooperate with an electrically conductive surface of the battery housing. Accordingly, the subject matter of claim 1 of the patent is novel over the disclosure of document D3.

4.5 Document D4 relates to a battery voltage indicator (20 in Figure 3) which is integral with a blister package (10 in Figure 1) for a battery. The voltage indicator includes a pair of electrical contacts (25,26 in Figure 3) positioned with respect to the package such

that they are accessible for the terminals of a battery to be placed therebetween. The voltage indicator comprises a liquid crystal material (31 in Figure 4) and a resistive element (24 in Figure 4) in thermal contact therewith. The resistive element is connected between the contacts and when current flows heat is transferred to the liquid crystal causing colour change proportional thereto and thus visually indicating battery voltage. Again, the battery tester is not integrated into a label as required by claim 1 of the patent in issue and does not cooperate with an electrically conductive surface of the battery housing. Accordingly, the subject matter of claim 1 of the patent is novel over the disclosure of document D4.

4.6 Document D5 relates to membrane touch switches, operation of which can be seen in Figure 1. Applications including instrumentation, appliances, electronic games and keyboards are mentioned. A touch switch is a three layer sandwich. Conductive patterns are deposited on the insides of the top and bottom sheets and a centre spacer is placed between the sheets. When pressure is applied to the top layer, it flexes through punched openings in the spacer to establish electrical contact between conductive pads of the upper and lower sheets. Upon release, the top sheet springs back to its normal open position. There is no reference either to batteries or to labels or voltmeters therefor. Accordingly, the subject matter of claim 1 of the patent is novel over the disclosure of document D5.

4.7 Document D9 relates to full charge indicators for cells. A strip of liquid crystal material is applied to the cell or structure associated therewith with one

segment (B in Figure 1) in thermal contact and a second segment (A in Figure 1) thermally insulated therefrom, such as by a piece of thermally insulating material (13 in Figure 1). By utilising the capability of the liquid crystal to change colour as its temperature changes and as the charging procedure involves the cell generating heat, colour variation between the liquid crystal segments is arranged to be indicative of charge condition. In the teaching of document D9, a different principle is concerned as there is no battery voltage measured nor any switch. Accordingly, the subject matter of claim 1 of the patent is novel over the disclosure of document D9.

5. *Inventive Step*

5.1 Document D1 was taken to represent the closest prior art in the proceedings before the first instance. Since operation of the indicator is chemical and not heat based and moreover more features corresponding to those of claim 1 of the patent are disclosed in the more modern arrangement of document D3, the board has doubts about whether this choice was the most appropriate. However, taking either document D1 or document D3 as closest prior art, the subject matter of claim 1 cannot be reached in an obvious way for the following reasons.

5.2 Having regard to development of technology, the board considers it reasonable to assume that the skilled person would have wished to replace the indicator disclosed in document D1 by a more modern device. As indicated in the annex to the summons to oral proceedings, an easy way of solving this problem would have been simply to replace the indicator with a more modern device, i.e. to send the tester of document D3

along with the battery in place of the indicator disclosed in document D1. If document D3 is taken as starting point in the prior art, then the problem solved by the invention is to provide an improved attachment of the tester to a battery. The obvious way to do this, with or without taking the teaching of document D1 into account, would have been to arrange the tester with its ends proud of the battery, such that the flexible tester could be bent to have its conductor contacts in contact with the battery terminals. The reason this is the obvious way is because in the case both of document D1 (Figure 1 embodiment) and document D3, connection of the tester is made to the battery terminals, so that the skilled person would also connect to the terminals in any "combination device". The sheet metal penetrations through the electrolyte according to the Figure 3 embodiment of document D1 also lead in a different direction to utilising a conductive surface of the battery housing. Consequently, no cooperation with a conductive surface of the battery housing within the meaning of claim 1 would have resulted from the teachings of documents D1 and D3 even in combination, i.e. there is a non obvious gap to jump to reach the subject matter of claim 1. The subject matter of claim 1 is thus considered to involve an inventive step over this document combination, starting from either document. The board observes in this context that the making of an electrical connection using the "tab switch" mentioned in column 5, line 51 to column 6, line 4 of the patent in issue is not in accordance with the wording of claim 1.

- 5.3 The appellant argues that the battery housing (zinc can) of document D1 with the battery end constitute the

terminal. However, in agreement with Exhibit 27a (see point VI *supra*) and also section II of document D6, the skilled person knows that in practice the zinc can of a battery of the type shown in document D1 is provided with a housing in the form of a cardboard jacket specifically to avoid the housing functioning as a terminal via the can. Attachment of the tester would thus, for visibility, be on top of such a jacket rather than thereunder and directly on the can shown at 20 in document D1. Cooperation with a cardboard jacket fails to meet the wording of the claim and moreover would defeat the purpose of the switch. Even supposing there were no jacket, document D1 explicitly shows electrical connection being made via wires or sheet metal. Only impermissible use of knowledge of the invention as claimed could therefore suggest making an electrical connection directly to the can disclosed in document D1. For a similar reason and given the curving of the flexible member utilised for 1.5 volt batteries according to document D3 and the importance of the cutouts corresponding with the terminals, the board is not persuaded without any hint in this document that the skilled person would have attached the voltmeter to a metal jacket of a battery of the sort referred to in document D6 with reference to pages 28 and 29 annexed thereto. Document D6 itself is also not persuasive in this respect since it, while mentioning a number of possibilities, reaches the conclusion that the configuration of the patent in issue is obvious because it is the best and not because the skilled person would have arrived at it without an inventive step from the prior art.

- 5.4 The remaining documents do not make good the gap in the teaching of documents D1 and D3. There is no incentive

at all for the skilled person to move the voltage indicating device from the package to the battery in the teaching of document D4, which document is explicitly directed to a package. This document cannot therefore fill the any gap relating to teaching of how voltage indicators are to be attached to batteries. Documents D2 and D5 respectively show a voltmeter and switch arrangement *per se*, but are also silent in respect of attachment of voltmeters to a battery. In view of the glass component used according to document D2, its application in a rough battery environment is in any case questionable. Since the device of document D9 is responsive to heat directly received from the battery, it does not need any electrical connection at all. Therefore document D9 also cannot provide a teaching pertaining to voltmeters and filling the gap towards the subject matter of claim 1.

- 5.5 In view of the foregoing, the subject matter of claim 1 is considered to involve an inventive step within the meaning of Article 56 EPC. The same applies to claims 2 to 11 which depend from claim 1.

Description

6. The board has noted that neither in examination nor in opposition proceedings did any circumstances arise resulting in the first instance taking action in the context of section C III 4.3 of the Guidelines about certain parts of the detailed description concerning various related examples of battery, label or voltmeter construction not necessarily according with claim 1 {see for example (2) and (3) in the last paragraph in column 5 and the first paragraph in column 6, both in relation to the claimed switch means or column 3,

line 27, column 4, line 17 or column 6, line 24 in relation to voltmeter integration into the label}. The board reads section 9 of the reasons for the decision under appeal as indicating that the opposition division nevertheless recognised for example that alternative (to that claimed) switch means was disclosed in the patent. The claim as granted is, during opposition proceedings, not open to objection under Article 84 EPC and, as is apparent from the above reasoning in relation to inventive step, the board has understood said certain parts of the description to concern related examples not forming part of the claimed invention, even without this being made explicit by a corresponding statement in the patent.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

P. Martorana

E. Turrini