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D E C I S I O N
of 9 August 1994

Case Number: T 0095/92 - 3.4.1

Application Number: 82300197.9

Publication Number: 0057520

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Language of the proceedings: EN

Title of invention:
A device for detecting a magnetic strip embedded in paper

Patentee:
KABUSHIKI KAISHA TOSHIBA

Opponent:
GAO Gesellschaft für Automation und Organisation mbH

Headword:
-

Relevant legal norms:
EPC Art. 56

Keyword:
"Inventive step - (no)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0095/92 - 3.4.1

D E C I S I O N
of the Technical Board of Appeal 3.4.1
of 9 August 1994

Appellant: (Opponent)
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Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office dated 29 November 1991 concerning maintenance of European patent No. 0 057 520 in amended form.**

Composition of the Board:

Chairman: G. D. Paterson
Members: U. G. O. Himmler
R. K. Shukla

Summary of Facts and Submissions

I. The Respondent "Kabushiki Kaisha Toshiba" is owner of European patent No. 0 057 520.

II. The Appellant filed an opposition on the grounds that the subject-matter of the patent was not new and did not involve an inventive step (Article 100(a) EPC); and relied inter alia on the following documents:

D1= DE-B-2 830 314
D2= US-A-3 896 292
D9= US-A-3 493 694

III. The patent was maintained in amended form by a decision of the Opposition Division dated 29 November 1991.

Claim 1 of the patent as amended reads as follows (the claim has been itemized in order to simplify references to different parts of the claim):

"A device for detecting the presence of a magnetic body (2) embedded in a sheet of paper (1), the magnetic body being a strip of elongate form having a narrow width at right angles to its length, said device comprising:

(a) magnetic field generating means (5) and
(b) a magnetoresistor (6)
(c) arranged in mutually fixed relation so that the resistance of the resistor (6) depends upon the magnetic field from the generating means and
(d) means (11 to 15) for determining the resistance variation of the resistor (6) when the magnetic body (2) causes the magnetic field at the resistor to vary, characterized in that

(e) the magnetic field generating means (5) and the magnetoresistor (6) are each of elongate form and each have a length substantially equal to the length of the strip to be detected, and

(f) means (3) are provided for transporting the sheet of paper (1) in the direction parallel to the width of the strip therein

(g) along a path disposed parallel to the widths of the strip (2) and the magnetic field generating means (5) and the magnetoresistor (6), such that the passage of the strip (2) along the path changes the magnetic field applied to the magnetoresistor (6)."

The Opposition Division held that none of the cited prior art documents disclosed all the features of Claim 1. The subject-matter of the claim was therefore found to be novel. Furthermore, the Opposition Division held that it was not obvious for a skilled person to arrive at the claimed invention by combining the teachings of D1 and D9. D1, in particular, did not disclose the feature (e). D9 disclosed a tape transported past elongated magnetic field generating means (permanent magnet 26), but the sole purpose of these means in D9 was to linearize the device by means of a magnetic bias. The magnetic field of these means was therefore not designed to enter into the tape in order to detect possible magnetic areas. The magnetic field generating means of D9 was thus for a purpose quite different from that of the magnetic field generating means of Claim 1 of the patent in suit, and the skilled person would therefore not combine the teaching of D1 with that of D9. Even if such a combination were made, the skilled person would not arrive at the subject-matter of Claim 1.

IV. The Appellant (Opponent) lodged an appeal against this decision and requested cancellation of the decision and the revocation of the patent.

In support of his request the Appellant filed the following additional documents:

D10= Meyer, Bibliographisches Institut, Korrigierter Nachdruck, 1980, pp. 614 and 653

D11= SIEMENS-Zeitschrift, Vol. 45 (1971) , No. 9, pp. 607-613

D12= SIEMENS-Zeitschrift, Vol. 45 (1971) , No. 10, pp. 681-686

D13= ELECTRONICS, February 1, 1973, pp. 91-96

D14= MAGNETTECHNIK KURZ UND BÜNDIG by E. Schaefer, Vogel-Verlag, Würzburg 1969, pp. 46/47, 52/53 and 148/149.

V. The Respondent requested the rejection of the appeal and the maintenance of the patent in amended form as decided by the Opposition Division.

VI. During oral proceedings held on 9 August 1994, the Respondent filed an amended Claim 1 as main request, which claim differs from the text set out above in that the expression "magnetic body" has been changed to "body of magnetizable material" and in that the word "substantially" in feature (e) has been changed to "at least".

Claim 1 forming the basis of an auxiliary request differs from the text set out above in that feature (e) has the following wording:

"the magnetic field generating means (5) and the magnetoresistor (6) are of elongate form and each has a length which is equal to that of the other and which is greater than the length of the strip to be detected and each has a width which is approximately equal to that of the other and is approximately equal to the width of the strip".

VII. The Appellant submitted essentially the following arguments in support of its request for revocation of the patent.

D2 discloses all the features of the preamble of Claim 1. D2 is concerned with detecting magnetizable metal pieces embedded in a card. The detection is done by using magnetic field generating means and magnetoresistors located such that the presence of a magnetizable piece changes the magnetic field at the position of the magnetoresistor. This change is detected as a change in resistance of the magnetoresistor.

Thus, document D2 exactly discloses the measuring principle of the patent in suit, namely, a magnetic field generating means and a magnetoresistor are arranged in a fixed relation in such a manner that a magnetizable body brought into the field of the magnetic field generating means changes the resistance of the magnetoresistor.

Some currency notes can have a magnetizable metal strip embedded therein, and this is not disputed by the Respondent; cf. page 8, 3rd paragraph of the Respondent's letter dated 14 October 1992. The skilled person would realise that the magnetizable strip embedded in a bank note can be detected by the same principle as the magnetizable pieces in a card as in D2. The skilled person would only have to change the

geometrical set up of the detector of D2 in order to adapt it to the geometry of the magnetizable strip in a bank note. Furthermore, the skilled person would want to detect the metal strips while the bank notes are transported to pass by the detection means. In order to adapt the device of D2 to the detection of moving bank notes with embedded metal strips, the skilled person would consider the teaching of D9 which relates to a similar technical field concerning the read-out of information stored on a magnetic tape. That this technical field is of interest to the skilled person concerned with detecting the moving metal strip in a bank note is clear from D1, where it is explicitly stated (column 2, lines 42 to 48) that the detection of security strips in bank notes is similar to the read-out done by tape players. D9 discloses all the features of the claimed subject-matter except that in D9 magnetized areas in a tape are detected instead of magnetizable strips in bank notes. From D9 the skilled person would thus learn that the magnetic field generating means and the magnetoresistor should be adapted to the area to be detected (the width of the tape in D9). The skilled person would thus be led to adapt the detection means known from D2 to the shape of the metal strip and to supply transport means as taught by D9. The skilled person would thereby arrive at the claimed subject-matter, which therefore lacks an inventive step.

VIII. The above arguments were contested by the Respondent, who argued essentially as follows.

The embodiment of D1 cannot give any incitement to the present invention because, in principle, it cannot be used. Its teaching concerns the detection of a **pre**magnetized strip, i.e. a magnet having a North- and a South-pole in the direction of the strip. Therefore the

bank notes have to pass through a poleshoe within which or under which the detection device is arranged.

D2 concerns the detection of a predetermined pattern of small metal pieces in a card. D2 is thus not concerned with the detection of metal **strips** embedded in bank notes or the like. In D2 the card, and thereby the magnetizable pieces to be detected, is held stationary during the detection. Contrary to this, according to the patent in suit the bank notes are transported to pass by the detection means and it is the change in the magnetic field caused by the moving metal strip which is detected.

D9 concerns the completely different field of reading out prerecorded information. The information is stored on a tape in the form of **magnetized** areas. D9 does therefore not concern the detection of **magnetizable** strips. Furthermore, since D9 concerns the detection of magnetized areas, there is, in principle, no need for separate magnetic field generating means. The purpose of the permanent magnet in D9 is only to modify the **output** of the resistor, i.e. to improve the quality of the signal, but **not** to modify the **change of the field** caused by the strip. Hence, the permanent magnet only causes the detector (the magnetoresistor) to work in a linear region. The permanent magnet thus has a completely different purpose in D9 than in the present invention, where the magnetic field generating means is an essential part, because without such means there would be no magnetic field at all, and without a magnetic field the magnetizable strips could not be detected.

Furthermore, the field produced by the permanent magnet in D9 must be quite weak, because otherwise it could destroy the recorded information. Contrary thereto, the magnetic field produced by the magnetic field generating

means according to the present invention must be quite strong in order to make it possible to detect the change in the field caused by the magnetizable strip. This means that even if the skilled person were to combine the teachings of D2 and D9, the subject-matter of the claim would not be obtained.

IX. At the conclusion of the oral proceedings the decision was announced that the decision under appeal is set aside, and that the patent is revoked.

Reasons for the Decision

1. *Inventive step*

The only question which has to be decided in the present appeal is that of inventive step.

1.1 In the Board's view, the state of the art coming closest to the claimed invention is disclosed in document D2. In this document there is described

a coded card detector device for detecting the presence of a body of magnetizable material embedded in a coded key card, the body consisting of small pieces of a high permeability metal arranged in a predetermined pattern in the card, said device comprising:

(a) magnetic field generating means and
(b) a magnetoresistor
(c) arranged in mutually fixed relation so that the resistance of the resistor depends upon the magnetic field from the generating means and

(d) means for determining the resistance variation of the resistor when the body causes the magnetic field at the resistor to vary.

Also, in D2, the variation in magnetic field, and therefore the variation in resistance, takes place only when the card is transported **into** the detection position, and not when the card is at rest in the detection position, as in the patent in suit.

This document lies in a technical field, namely, security requirements against counterfeiting, which is similar to that of the patent in suit.

1.2 The subject-matter of Claim 1 according to the main request is distinguished from the device of document D2 by the following features:

-- the magnetizable body is embedded in a sheet of paper whereas in the state of the art according to D2 the body is embedded in a plastic card, e.g. used as a key, or in a ticket for use in a vending or service machine (column 3, lines 19 and 39 to 40);

-- the magnetizable body is a strip of elongate form having a narrow width at right angles to its length whereas in the state of the art according to D2 the body consists of pieces of small dimensions arranged in a predetermined pattern;

-- the magnetic field generating means and the magnetoresistor are each of elongate form and each have a length at least equal to the length of the strip to be detected whereas in the state of the art according to D2 the magnetic field generating means are tapered and have pyramidal shaped tips (column 6, lines 10 to 11) adapted to the dimensions of the magnetizable pieces;

-- means are provided for transporting the sheet of paper in the direction parallel to the width of the strip therein whereas in the state of the art according to D2 the card or ticket has to be placed exactly in a predetermined fixed position;
-- the transportation path is disposed parallel to the widths of the strip and the magnetic field generating means and the magnetoresistor, such that the passage of the strip along the path changes the magnetic field applied to the magnetoresistor; this last effect is achieved in the state of the art according to D2, too, if the small pieces of steel are correctly positioned over the magnetoresistors.

1.3 In relation to the state of the art according to D2 the problem addressed by the present invention is to provide a device using the general principles known from D2 for detecting the presence of an elongate magnetizable strip embedded in a sheet of paper such as a currency note.

1.4 This objective problem is solved by
-- provision of a means for transporting the sheet of paper and
-- geometrical adaptation of the detecting apparatus from a pattern of small pieces to a strip having a narrow width at right angles to its length,

as set out in the characterizing part of Claim 1.

1.5 In the Board's view, it belongs to the basic knowledge of a skilled person in the field of Hall-effect magnetoresistive sensors that the variation of the resistance of magnetoresistors is not influenced by the speed with which a magnetizable body moves in the magnetic flux; cf. D13, in particular the title on page 91 and page 92, right column, last 7 lines, cited as evidence of the knowledge of the person skilled in

the art at the priority date. Consequently, the skilled person had to consider only the provision of a transportation system for thin and flexible material comparable to paper sheets.

1.6 Also the means for the geometrical adaptation of the measuring apparatus to a strip having a narrow width at right angles to its length were at the disposal of the skilled person at the priority date because he knew of the existence of magnets and magnetoresistors of elongate form.

Furthermore, the skilled person knew at the priority date of the patent in suit (cf. document D1, column 2, line 45 to 46), that magnetoresistive sensor devices as used for example in D9 in the field of tape recorders and as used in the field of detecting strips of magnetic material embedded in a sheet of paper, employ the same basic principle. Therefore, in the Board's view, document D9 was comprised in a technical field which would have been routinely consulted by the skilled person looking for a solution in the problem of detecting a magnetizable strip embedded in a sheet of paper.

Document D9 discloses a device comprising all structural features of Claim 1 (cf. Figure 2 and Figure 7 together with the relevant parts of the description):

(a) - magnetic field generating means (26 in Figure 2) and
(b) - a magnetoresistor (12' in Figure 2) which are
(c) - arranged in mutually fixed relation so that the resistance of the resistor (12') depends upon the magnetic field from the generating means (26) and
(d) - means (18, 19', 20' in Figure 2) for determining the resistance variation of the resistor (12')

when the body (tape 16 in Figure 2) causes the magnetic field at the resistor (12') to vary,

(e) - the magnetic field generating means (26) and the magnetoresistor (12') are each of elongate form and each have a length (cf. Figure 7) at least equal to the length of a magnetized strip on the tape (16), and

(f) - means are provided for transporting (this is implicit in a tape recorder; see also column 2, line 63) the tape (which is in its physical properties like flexibility, elasticity, thickness and tensile strength equivalent to a sheet of paper) in the direction parallel to the width of the strip (carrying the information) therein

(g) - along a path disposed parallel to the widths of the strip and the magnetic field generating means (26) and the magnetoresistor (12'), such that the passage of a strip (of the tape 16) along the path changes the magnetic field applied to the magnetoresistor (12').

In the Board's view, it would be immediately apparent to the skilled person that this device would be suitable for detecting the presence of an elongate strip of magnetizable material embedded in a sheet of paper with appropriate modifications in the magnetic field.

1.7 Therefore, the person skilled in the art would consider using the arrangement of the magnetoresistor and the magnetic field generating means known from D9 for solving the problem as set out under 2.3 without the exercise of any inventive skill.

1.8 For the reasons set out below, the Board does not accept the submissions of the Respondent that

(a) - the expert would not take into consideration document D9 because it concerns a completely different technical field;

(b) - the magnetic field generating means in document D9 is not necessary in principle but serves only to improve the quality of the output signal;

(c) - contrary to the present invention which requires a strong magnetic field, the magnetic field produced by the field generating means of D9 must be rather weak, because otherwise it could destroy the recorded information on the tape.

As to (a), the inventors of the device described in document D1, who must be considered as experts in the field of checking securities and bank notes, refer to the applicability of the principles used in an audio tape recorder field also for the purposes of security checks of bank notes. In the Board's view, D1 clearly shows that these two fields overlap so that the skilled person in the field of security checks on bank notes must be presumed to be aware of the techniques employed in the field of tape recorders insofar as these employ the same basic principles of detection.

As to (b), in the Board's view it was common general knowledge at the priority date of the patent in suit that measurable variations of the resistance of the magnetoresistor are obtained only if the resistor is operated over a selected part of its response curve. By adjusting the strength of the magnetic field the optimum operating point is determined in the present patent as well as in the case of the device of D9 (see document D2, Figure 6 and the relevant description column 10, lines 28 to 49).

As to (c), Claim 1 under consideration is silent about the required strength of the magnetic field.

2. *Claim 1 according to the auxiliary request*

2.1 The additional features in part (e) of Claim 1 according to the auxiliary request concern only a simple geometrical adaptation of the magnetic field generating means and the magnetoresistor, to the probe consisting of the magnetizable strip in order to get an optimal output.

2.2 Moreover, D9 discloses that the magnetic field generating means (26) and the magnetoresistor (12') each have the same length (see Figure 2) and which is greater than the length of the area to be detected (from Figure 7 it is known that the length in question is greater than the width of the tape, i.e. the length must be greater than the length of the area to be detected, since this area is recorded on the tape). Furthermore, D9 discloses that the magnetoresistor and the permanent magnet each has a width which is approximately equal to that of the other (see Figure 2).

3.3 For reasons analogous to those stated above, it would therefore, in the Board's view, be obvious to include these features when adapting the device of D2 for the detection of a magnetizable strip embedded in paper.

Therefore, in the Board's judgment, the subject-matter of the auxiliary request does not involve an inventive step.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

M. Beer G. D. Paterson