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Datasheet for the decision
of 21 March 2013

Case Number: T 1161/08 - 3.4.01

Application Number: 02013534.9

Publication Number: 1271389

IPC: G06K 9/20, G07C 9/00

Language of the proceedings: EN

Title of invention:
Fingerprint input device

Applicant:
NEC Personal Computers, Ltd.

Headword:
-

Relevant legal provisions:
RPBA Art. 13(1)
EPC Art. 123(2)

Relevant legal provisions (EPC 1973):
EPC Art. 54, 56

Keyword:
"Novelty (yes)"
"Inventive step (no)"
"Admissibility of a new request (no)"
"Change of category of claims (not allowable) under Art. 123(2) EPC)"

Decisions cited:
-

Catchword:
-

EPA Form 3030   This datasheet is not part of the Decision.
                    It can be changed at any time and without notice.
C9667.D

Case Number: T 1161/08 - 3.4.01

D E C I S I O N
of the Technical Board of Appeal 3.4.01
of 21 March 2013

Appellant: NEC Personal Computers, Ltd.
(Applicant)   11-1, Osaki 1-chome
                         Shinagawa-ku
                         Tokyo 141-0032   (JP)

Representative: Vossius & Partner
                         Siebertstraße 4
                         D-81675 München   (DE)

Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 18 February 2008
refusing European patent application
No. 02013534.9 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman: H. Wolfrum
Members: P. Fontenay
               C. Schmidt

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Summary of Facts and Submissions

I.   The appeal lies from the decision of the examining
      division to refuse European patent application
      No. 02 013 534.9. The decision was remitted to the post
      on 18 February 2008.

      The decision relied on the finding that the subject-
      matter of independent claim 1 of the main request and
      auxiliary request then on file was not new in view of
      document JP-A-2000-217803 (D3).

II.   The appellant (applicant) filed an appeal against the
      above decision by notice of appeal received on 17 April
      2008. The prescribed appeal fee was paid on the same
      day. The written statement setting out the grounds of
      appeal was received on 6 June 2008. It was requested
      that the decision under appeal be set aside and a
      patent be granted on the basis of a set of claims 1 to
      30 according to a main request or, alternatively, on
      the basis of a set of claims 1 to 29 or 1 to 3
      according to a first and a second auxiliary request,
      respectively. All three sets of claims were filed with
      the statement of grounds.

      Independent claim 1 of the main request and first
      auxiliary request differed from claim 1 of the
      auxiliary request underlying the impugned decision in
      that the thickness of the transparent solid film was
      further defined as being 64μm or less. Independent
      claims 1 and 3 of the second auxiliary request were
      directed to methods for setting a fingerprint input
      device. In an "obiter dictum", the examining division
      had considered the subject-matter of such method claims

to be both new and inventive but lacking industrial application because the refractive index of a material could not be changed.

III.   In the statement of grounds, the appellant presented arguments which, in its opinion, established that the claimed invention was new over document D3. The appellant, more particularly, emphasised that it was not justified to draw any conclusion from the prior art with regard to specific dimensions regarding some parts of a device from diagrammatic representations. In particular, the interpretation of Figure 2 of D3 relied upon by the examining division in concluding that the thickness of cover 1B was smaller than the pitch of the ridgelines was not correct.

IV.   On 9 November 2012, summons to attend oral proceedings were issued.

        In a communication dated 27 November 2012 issued pursuant to Article 15(1) of the Rules of Procedure of the Boards of Appeal (RPBA), the Board expressed its provisional opinion with regard to the requests then on file. In the Board's opinion, the absence of any indication in document D3 as to the refractive index of the glass layer was sufficient to establish novelty of the claimed fingerprint input device as defined in claim 1 of the main request and auxiliary requests. The Board, however, expressed its doubts as to whether the claimed ranges regarding the refractive index and thickness of the transparent solid film were sufficient to justify an inventive step.

Concerning, more specifically, the claims of the second auxiliary request directed to methods for setting a fingerprint input device of a light transmission type, the Board observed that the original application documents did not appear to provide a basis of disclosure for such a method, i.e. for a method of preparing a fingerprint device for later use. Such a claimed process was indeed to be distinguished from the mathematical elaborations described in great detail throughout the description.

V.   With a letter dated 13 February 2013 filed in reply to the communication of the Board, the appellant filed a new main request and auxiliary requests 1 and 2 taking into account some of the comments made by the Board. Arguments were also presented showing, in the appellant's view, that the claimed devices and methods did indeed involve an inventive step.

VI.   Oral proceedings before the Board took place on 21 March 2013 in the presence of the appellant's representatives.

       During the oral proceedings, the appellant initially confirmed its requests, as filed with letter dated 13 February 2013. A new second auxiliary request was filed following the debate regarding the main and first auxiliary requests, and the previous auxiliary request 2 was renumbered accordingly as auxiliary request 3.

       When asked for the reasons justifying the late filing of the new second auxiliary request, the appellant indicated that it had not expected that the main and

first auxiliary requests would be rejected by the
Board.

Thus the appellant requested that the decision under
appeal be set aside and that a patent be granted on the
basis of the main request as filed on 13 February 2013
or, alternatively, on the basis of various sets of
claims according to first, second or third auxiliary
requests. The first and third auxiliary requests
correspond to the first and second auxiliary requests
filed with letter of 13 February 2013, while the second
auxiliary request is a new request filed during oral
proceedings.

VII.   Claim 1 of the appellant's main request reads:

"1.   A fingerprint input device of a light transmission
type comprising:

        a light source (11,12;17;19) for applying light to
a measurement target finger;

        a two-dimensional image sensor (5) for picking up
a fingerprint image from a fingerprint measured portion
of the measurement target finger (1) based on incident
light from inside the measurement target finger, said
fingerprint measured portion having a fingerprint
ridgeline portion (2) and a fingerprint valley portion
(3); and

        a transparent solid film (4) mounted on an image
pickup surface of said two-dimensional image sensor,
said fingerprint measured portion being in contact with
said transparent solid film when said two-dimensional
image sensor picks up said fingerprint image,
        wherein said fingerprint input device picks up an
image of said fingerprint ridgeline portion in said
fingerprint measured portion as a light portion, and

picks up an image of said fingerprint valley portion in said fingerprint measured portion as a dark portion,

wherein a refractive index of said transparent solid film is 1.4 or more, and

said transparent solid film has a thickness sufficiently less than the distance between adjoining fingerprint ridgelines and being 64μm or less."

Independent claim 29 of the main request reads:

"29. A method for providing a fingerprint input device of a light transmission type comprising:

a light source (11,12;17;19) for applying light to a measurement target finger;

a two-dimensional image sensor (5) for picking up a fingerprint image from a fingerprint measured portion of the measurement target finger (1) based on incident light from inside the measurement target finger, said fingerprint measured portion having a fingerprint ridgeline portion (2) and a fingerprint valley portion (3); and

a transparent solid film (4) mounted on an image pickup surface of said two-dimensional image sensor, said fingerprint measured portion being in contact with said transparent solid film when said two-dimensional image sensor picks up said fingerprint image,

wherein said fingerprint input device picks up an image of the fingerprint ridgeline portion in said fingerprint measured portion as a light portion, and picks up an image of the fingerprint valley portion in said fingerprint measured portion as a dark portion,

the method comprising the steps of:

setting a refractive index n_3 of said transparent solid film so as to satisfy a condition that contrast C_0

*before contrast reduction occurs due to the thickness
of the transparent solid film is equal to or more than
a desired value, said contrast C_0 being defined by an
equation 1 and A) being obtained by assigning equations
2 and 3 to the equation 1 in a case where a refractive
index n_3 of said transparent solid film $\geq$ a refractive
index n_1 of a cortex of said finger > a refractive index
$n_2 = 1.000$ of air or B) being obtained by assigning
equations 2 and 4 to the equation 1 in a case where the
refractive index n_1 of the cortex of said finger > the
refractive index n_3 of said transparent solid film > the
refractive index $n_2 = 1.000$ of the air,*

wherein said equation 1 is as follows:

$C_0 = (P_{3L} - P_{3D})/P_{3L}$

where

*P_{3L}: power of downward light in all directions
right under the fingerprint valley portion, and*

*P_{3D}: the power of the downward light in all
directions right under the fingerprint ridgeline
portion,*

wherein said equation 2 is as follows:

$$P_{3D} = (\,|\,p_1\,|\,\cdot\,\int_{\theta c(\text{①}\to\text{②})}\,t_D(\text{①}\to\text{②})\,d\theta_{1D}\,)\cdot(\,\int_{\theta}^{90°}t_D(\text{②}\to\text{③})\,d\theta_{2Di}\,)$$

where

$\theta_{c(\text{①}\to\text{②})} = \sin^{-1}(n_2/n_1)$

$t_D(\text{①}\to\text{②}) = (1/2)\cdot(\sin2\theta_{1D}\cdot\sin2\theta_{2D})/\sin^2(\theta_{1D}+\theta_{2D})$
$\qquad\cdot(1+1/\cos(\theta_{1D}-\theta_{2D}))$

$\theta_{2D} = \sin^{-1}(n_1/n_2\sin\theta_{1D})$

$t_D(\text{②}\to\text{③}) = (1/2)\cdot(\sin2\theta_{2Di}\cdot\sin2\theta_{3D})/\sin^2(\theta_{2Di}+\theta_{3D})$
$\qquad\cdot(1+1/\cos(\theta_{2Di}-\theta_{3D}))$

$\theta_{3D} = \sin^{-1}(n_2/n_3\sin\theta_{2Di})$

*Θ_{1D}: the incidence angle of light incident on the air
layer in the fingerprint valley portion*

Θ_{2Di}: *the incidence angle of light incident on the transparent solid film from the air layer right under the fingerprint valley portion*

wherein said equation 3 is as follows:

$$P_{3L} = (|\, p_1\, | \cdot \int_0^{80°} t_L(①\to③)\, d\theta_{1D})$$

where

$$t_L(①\to③) = (1/2) \cdot (\sin 2\theta_{1L} \cdot \sin 2\theta_{3L}) / \sin^2(\theta_{1L} + \theta_{3L})$$
$$\cdot (1 + 1/\cos(\theta_{1L} - \theta_{3L}))$$
$$\theta_{3L} = \sin^{-1}(n_1/n_3 \sin\theta_{1L})$$

Θ_{1L}: *the incidence angle of light incident on the transparent solid film in the fingerprint ridgeline portion*

and wherein said equation 4 is as follows:

$$P_{3L} = (|\, p_1\, | \cdot \int_0^{\theta c(①\to③)} t_L(①\to③)\, d\theta_{1D})$$

where

$$\theta c(①\to③) = \sin^{-1}(n_3/n_1)$$
$$t_L(①\to③) = (1/2) \cdot (\sin 2\theta_{1L} \cdot \sin 2\theta_{3L}) / \sin^2(\theta_{1L} + \theta_{3L})$$
$$/ \sin^2(\theta_{1L} + \theta_{3L}))$$
$$\theta_{3L} = \sin^{-1}(n_1/n_3 \sin\theta_{1L}) ,$$

Claims 1 to 28 and 30 of the main request depend respectively on independent claims 1 and 29.

The first auxiliary request differs from the main request in that independent claim 29 has been amended by incorporating the features of dependent claim 30.

Independent claim 1 of auxiliary request 2 reads:

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"1.   A fingerprint input device of a light transmission
type comprising:

a light source (11,12;17;19) for applying light to
a measurement target finger;

a two-dimensional image sensor (5) for picking up
a fingerprint image from a fingerprint measured portion
of the measurement target finger (1) based on incident
light from inside the measurement target finger, said
fingerprint measured portion having a fingerprint
ridgeline portion (2) and a fingerprint valley portion
(3); and

a transparent solid film (4) mounted on an image
pickup surface of said two-dimensional image sensor,
said fingerprint measured portion being in contact with
said transparent solid film when said two-dimensional
image sensor picks up said fingerprint image,

wherein said fingerprint input device picks up an
image of the fingerprint ridgeline portion in said
fingerprint measured portion as a light portion, and
picks up an image of the fingerprint valley portion in
said fingerprint measured portion as a dark portion,

wherein the refractive index n_3 of said transparent
solid film is set so as to satisfy a condition that
contrast C_0 before contrast reduction occurs due to the
thickness of the transparent solid film is equal to or
more than a desired value, said contrast C_0 being
defined by an equation 1 and A) being obtained by
assigning equations 2 and 3 to the equation 1 in a case
where a refractive index n_3 of said transparent solid
film $\geq$ a refractive index n_1 of a cortex of said finger
> a refractive index $n_2 = 1.000$ of air or B) being
obtained by assigning equations 2 and 4 to the equation
1 in a case where the refractive index n_1 of the cortex
of said finger > the refractive index n_3 of said

*transparent solid film > the refractive index n_2 = 1.000
of the air,*

wherein said equation 1 is as follows:

C_0= $(P_{3L} - P_{3D})/P_{3L}$

where

*P_{3L}: power of downward light in all directions
right under the fingerprint valley portion, and*

*P_{3D}: the power of the downward light in all
directions right under the fingerprint ridgeline
portion,*

wherein said equation 2 is as follows:

$$P_{3D} = \left(|p_1| \cdot \int_0^{\theta_{c(①→②)}} t_D(①→②)\, d\theta_{1D} \right) \cdot \left(\int_0^{80°} t_D(②→③)\, d\theta_{2Di} \right)$$

where

$$\theta_{c(①→②)} = \sin^{-1}(n_2/n_1)$$
$$t_D(①→②) = (1/2) \cdot (\sin 2\theta_{1D} \cdot \sin 2\theta_{2D}) / \sin^2(\theta_{1D} + \theta_{2D})$$
$$\cdot (1 + 1/\cos(\theta_{1D} - \theta_{2D}))$$
$$\theta_{2D} = \sin^{-1}(n_1/n_2 \sin \theta_{1D})$$
$$t_D(②→③) = (1/2) \cdot (\sin 2\theta_{2Di} \cdot \sin 2\theta_{3D}) / \sin^2(\theta_{2Di} + \theta_{3D})$$
$$\cdot (1 + 1/\cos(\theta_{2Di} - \theta_{3D}))$$
$$\theta_{3D} = \sin^{-1}(n_2/n_3 \sin \theta_{2Di})$$

*Θ_{1D}: the incidence angle of light incident on the air
layer in the fingerprint valley portion*

*Θ_{2Di}: the incidence angle of light incident on the
transparent solid film from the air layer right
under the fingerprint valley portion*

wherein said equation 3 is as follows:

$$P_{3L} = \left(|p_1| \cdot \int_0^{80°} t_L(①→③)\, d\theta_{1D} \right)$$

where

$$t_{L(①\to③)} = (1/2)\cdot(\sin 2\theta_{1L}\cdot\sin 2\theta_{3L})/\sin^2(\theta_{1L}+\theta_{3L})$$
$$\cdot(1+1/\cos(\theta_{1L}-\theta_{3L}))$$
$$\theta_{3L} = \sin^{-1}(n_1/n_3\sin\theta_{1L})$$

Θ_{1L}: *the incidence angle of light incident on the transparent solid film in the fingerprint ridgeline portion*

and wherein said equation 4 is as follows:

$$P_{3L} = (\,|\,p_1\,|\,\cdot\int_{\theta_{c(①\to③)}} t_L(①\to③)\,d\theta_{1D})$$

where

$$\theta_{c(①\to③)} = \sin^{-1}(n_3/n_1)$$
$$t_{L(①\to③)} = (1/2)\cdot(\sin 2\theta_{1L}\cdot\sin 2\theta_{3L})/\sin^2(\theta_{1L}+\theta_{3L})$$
$$/\sin^2(\theta_{1L}+\theta_{3L}))$$
$$\theta_{3L} = \sin^{-1}(n_1/n_3\sin\theta_{1L})\,,$$

Independent claim 3 of auxiliary request 2 reads:

"3.   A fingerprint input device of a light transmission type comprising:

a light source (11,12; 17; 19) for applying light to a measurement target finger;

a two-dimensional image sensor (5) for picking up a fingerprint image from a fingerprint measured portion of the measurement target finger (1) based on incident light from inside the measurement target finger, and

a plurality of micro-lenses (13) mounted on respective light receiving elements on an image pickup surface of said two-dimensional image sensor, said fingerprint measured portion being in contact with said plurality of micro-lenses when said two-dimensional image sensor picks up said fingerprint image,

wherein said fingerprint input device picks up an image of a fingerprint ridgeline portion (2) in said

*fingerprint measured portion as a light portion, and
picks up an image of a fingerprint valley portion (3)
in said fingerprint measured portion as a dark portion,*

*wherein the refractive index n_3 of said micro-
lenses is set so as to satisfy a condition that
contrast C_0 before contrast reduction occurs due to the
thickness of the micro-lenses is equal to or more than
a desired value, said contrast C_0 being defined by an
equation 1, and A) being obtained by assigning
equations 2 and 3 to the equation 1 in a case where a
refractive index n_3 of said micro-lenses $\geq$ a refractive
index n_1 of a cortex of said finger > a refractive index
$n_2 = 1.000$ of air or B) being obtained by assigning
equations 2 and 3 to the equation 1 in a case where the
refractive index n_1 of the cortex of said finger > the
refractive index n_3 of said micro-lenses > the
refractive index $n_2 = 1.000$ of the air,*

wherein said equation 1 is as follows:

$C_0 = (P_{3L} - P_{3D})/P_{3L}$

where

*P_{3L}: power of downward light in all directions
right under the fingerprint valley portion, and*

*P_{3D}: the power of the downward light in all
directions right under the fingerprint ridgeline
portion,*

wherein said equation 2 is as follows:

$$P_{3D} = (|p_1| \cdot \int_{\theta c(①→②)} t_D(①→②) d\theta_{1D}) \cdot (\int_{\theta}^{\theta 0} t_D(②→③) d\theta_{2Di})$$

where

$$\theta c(①-②) = \sin^{-1}(n_2/n_1)$$

$$t_D(①-②) = (1/2) \cdot (\sin 2\theta_{1D} \cdot \sin 2\theta_{2D})/\sin^2(\theta_{1D} + \theta_{2D})$$
$$\cdot (1 + 1/\cos(\theta_{1D} - \theta_{2D}))$$

$$\theta_{2D} = \sin^{-1}(n_1/n_2 \sin \theta_{1D})$$

$$t_D(②-③) = (1/2) \cdot (\sin 2\theta_{2Di} \cdot \sin 2\theta_{3D})/\sin^2(\theta_{2Di} + \theta_{3D})$$
$$\cdot (1 + 1/\cos(\theta_{2Di} - \theta_{3D}))$$

$$\theta_{3D} = \sin^{-1}(n_2/n_3 \sin \theta_{2Di})$$

Θ_{1D}: *the incidence angle of light incident on the air layer in the fingerprint valley portion*

Θ_{2Di}: *the incidence angle of light incident on the transparent solid film from the air layer right under the fingerprint valley portion*

wherein said equation 3 is as follows:

$$P_{3L} = (|\rho_1| \cdot \int_{0}^{90°} t_L(①-③)d\theta_{1D})$$

where

$$t_R(①-③) = (1/2) \cdot (\sin 2\theta_{1L} \cdot \sin 2\theta_{3L})/\sin^2(\theta_{1L} + \theta_{3L})$$
$$t_L \quad \cdot (1 + 1/\cos(\theta_{1L} - \theta_{3L}))$$

$$\theta_{3L} = \sin^{-1}(n_1/n_3 \sin \theta_{1L})$$

Θ_{1L}: *the incidence angle of light incident on the transparent solid film in the fingerprint ridgeline portion*

and wherein said equation 4 is as follows:

$$P_{3L} = (|\rho_1| \cdot \int_{0}^{\theta c(①-③)} t_L(①-③)d\theta_{1D})$$

where

$$\theta c(①-③) = \sin^{-1}(n_3/n_1)$$

$$t_D(①-③) = (1/2) \cdot (\sin 2\theta_{1L} \cdot \sin 2\theta_{3L})/\sin^2(\theta_{1L} + \theta_{3L})$$
$$t_L \quad /\sin^2(\theta_{1L} + \theta_{3L}))$$

$$\theta_{3L} = \sin^{-1}(n_1/n_3 \sin \theta_{1L}),$$

Independent claim 4 of auxiliary request 2 is identical
to independent claim 29 of the main request.

Independent claim 6 of auxiliary request 2 reads as
follows:

*"6.   A method for providing a fingerprint input device
of a light transmission type comprising:*

*a light source (11,12; 17; 19) for applying light
to a measurement target finger;*

*a two-dimensional image sensor (5) for picking up
a fingerprint image from a fingerprint measured portion
of the measurement target finger (1) based on incident
light from inside the measurement target finger, and*

*a plurality of micro-lenses (13) mounted on
respective light receiving elements on an image pickup
surface of said two-dimensional image sensor, said
fingerprint measured portion being in contact with said
plurality of micro-lenses when said two-dimensional
image sensor picks up said fingerprint image,*

*wherein said fingerprint input device picks up an
image of a fingerprint ridgeline portion (2) in said
fingerprint measured portion as a light portion, and
picks up an image of a fingerprint valley portion (3)
in said fingerprint measured portion as a dark portion,*

the method comprising the steps of:

*setting a refractive index n_3 of said micro-lenses
so as to satisfy a condition that contrast C_0 before
contrast reduction occurs due to the thickness of the
micro-lenses is equal to or more than a desired value,
said contrast C_0 being defined by an equation 1, and A)
being obtained by assigning equations 2 and 3 to the
equation 1 in a case where a refractive index n_3 of said*

micro-lenses ≥ a refractive index n_1 of a cortex of said finger > a refractive index n_2 = 1.000 of air or B) being obtained by assigning equations 2 and 3 to the equation 1 in a case where the refractive index n_1 of the cortex of said finger > the refractive index n_3 of said micro-lenses > the refractive index n_2 = 1.000 of the air,

wherein said equation 1 is as follows:

C_0= $(P_{3L} - P_{3D})/P_{3L}$

where

P_{3L}: power of downward light in all directions right under the fingerprint valley portion, and

P_{3D}: the power of the downward light in all directions right under the fingerprint ridgeline portion,

wherein said equation 2 is as follows:

$$P_{3D} = \left(|p_1| \cdot \int_{\theta}^{\theta c(①→②)} t_D(①→②) \, d\theta_{1D} \right) \cdot \left(\int_{\theta}^{90°} t_D(②→③) \, d\theta_{2Di} \right)$$

where

$$\theta_{c(①→②)} = \sin^{-1}(n_2/n_1)$$
$$t_{D(①→②)} = (1/2) \cdot (\sin 2\theta_{1D} \cdot \sin 2\theta_{2D}) / \sin^2(\theta_{1D} + \theta_{2D})$$
$$\cdot (1 + 1/\cos(\theta_{1D} - \theta_{2D}))$$
$$\theta_{2D} = \sin^{-1}(n_1/n_2 \sin \theta_{1D})$$
$$t_{D(②→③)} = (1/2) \cdot (\sin 2\theta_{2Di} \cdot \sin 2\theta_{3D}) / \sin^2(\theta_{2Di} + \theta_{3D})$$
$$\cdot (1 + 1/\cos(\theta_{2Di} - \theta_{3D}))$$
$$\theta_{3D} = \sin^{-1}(n_2/n_3 \sin \theta_{2Di})$$

Θ_{1D}: the incidence angle of light incident on the air layer in the fingerprint valley portion

Θ_{2Di}: the incidence angle of light incident on the transparent solid film from the air layer right under the fingerprint valley portion

wherein said equation 3 is as follows:

$$P_{3L} = \left(|p_1| \cdot \int_0^{90°} t_L(① \to ③) d\theta_{1D} \right)$$

where

$$t_L(① \to ③) = (1/2) \cdot (\sin 2\theta_{1L} \cdot \sin 2\theta_{3L}) / \sin^2(\theta_{1L} + \theta_{3L})$$
$$\cdot (1 + 1/\cos(\theta_{1L} - \theta_{3L}))$$
$$\theta_{3L} = \sin^{-1}(n_1 / n_3 \sin\theta_{1L})$$

Θ_{1L}: *the incidence angle of light incident on the*
transparent solid film in the fingerprint
ridgeline portion

and wherein said equation 4 is as follows:

$$P_{3L} = \left(|p_1| \cdot \int_0^{\theta_c(① \to ③)} t_L(① \to ③) d\theta_{1D} \right)$$

where

$$\theta_c(① \to ③) = \sin^{-1}(n_3 / n_1)$$
$$t_L(① \to ③) = (1/2) \cdot (\sin 2\theta_{1L} \cdot \sin 2\theta_{3L}) / \sin^2(\theta_{1L} + \theta_{3L})$$
$$/ \sin^2(\theta_{1L} + \theta_{3L}))$$
$$\theta_{3L} = \sin^{-1}(n_1 / n_3 \sin\theta_{1L}),$$

Auxiliary request 3 differs from auxiliary request 2 in
that device claims 1 to 3 have been deleted.

Reasons for the Decision

1.   *Applicable law*

This decision is issued after the entry into force of
the EPC 2000 on 13 December 2007, whereas the present
application was filed before this date. Reference is
therefore made to the relevant transitional provisions
indicating which articles and rules of the EPC 1973 and

the EPC 2000 are applicable to the present application. References to articles or rules of the old EPC are followed by the indication "1973" (cf. EPC, Citation practice).

2.   *Admissibility of the appeal*

The notice of appeal and the statement of grounds comply with the requirements of Articles 106 to 108 EPC and Rule 99 EPC. The appeal is, therefore, admissible.

3.   *Main request*

3.1   Reference is made in this decision to the following documents:

D3:   JP-A-2000-217803;
D3a: US-B-6 829 375 (a family member of D3), and
   a patent abstract of D3 from "Patent Abstracts of
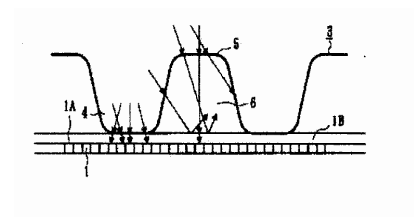   Japan" (PAJ) in English.
A machine translation of document D3 was also available.

3.2   *Novelty (Article 54 EPC 1973)*

3.2.1   Document D3 discloses a fingerprint input device of a transmission type comprising a light source for applying light to a measurement target finger (cf. D3, Figure 3).
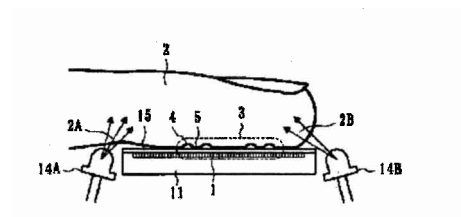
D3, Figure 3   D3, Figure 2

The device further comprises a two-dimensional image
sensor for picking up a fingerprint image from a
fingerprint measured portion of the measurement target
finger based on incident light from inside the
measurement target finger (cf. Abstract). A transparent
solid film mounted on an image pickup surface of the
two-dimensional sensor is provided in the device of D3
(cf. D3, paragraph [0010]). When the two-dimensional
image sensor picks up the fingerprint image, the
fingerprint measured portion is in contact with the
transparent film (cf. Figures 1-3). Moreover, the
fingerprint input device of D3 picks up an image of the
fingerprint ridgeline portion as a light portion
whereas a fingerprint valley portion appears as a dark
portion, as recited in claim 1 of the main request (cf.
Abstract).

3.2.2   Document D3a claims the priority of the application
corresponding to document D3. It is therefore assumed
to provide a fair indication as to the actual teaching
of document D3, at least insofar as this teaching is
consistent with the content of the machine translation
of document D3 in the English language. Hence, in the
absence of any information regarding the refractive
index of the transparent solid film in D3a, it is
considered that this aspect is not actually addressed
in document D3, which merely specifies that the
transparent solid film is made of glass (cf. D3a,
column 2, lines 26-33; D3, paragraph [0010]).

The Board does not share the view of the examining
division that the feature concerning the refractive
index of the transparent film is anticipated by the

teaching of document D3. The examining division based its conclusion on the observation that a value of 1.4 for the refractive index actually corresponded to the value for normal glass and that "*The applicant could not show why D3 would have used a more unusual type of glass which has a refractive index lower than 1.4...*" (cf. contested decision, point 8.2). In fact, the analysis relied upon by the examining division is not convincing because it is not compatible with the strict standards of "photographic novelty" developed by the jurisprudence of the boards of appeal. These standards require that a feature be disclosed in the prior art, whether explicitly or implicitly, together with the other features of a claim, in order to substantiate an objection of lack of novelty. Under the present circumstances, although the observation that normal glass has a refractive index higher than 1.4 is correct, it is nevertheless not sufficient to establish that this feature is implicitly disclosed in document D3. As acknowledged by the appellant in paragraph [0017] of the published application, other types of glass exist such as e.g. BeF_2 glass or 20LiF 30NaF 50BeF_2 glass whose refractive indexes do not meet the claimed condition. The claimed feature could therefore have been derived from D3 only if the examining division had been able to provide evidence that such unusual glasses would have indeed been excluded, for whatever reason (physical constraints, availability, etc.), for the purpose of manufacturing the transparent solid film.

The Board would point out that it is normally for the instance objecting to a claim (examining division or board of appeal) to substantiate its objection, and not

for the applicant to provide evidence to the contrary.
The Board cannot identify, in the present situation,
any reason justifying the approach followed by the
examining division which led to a reversal of the
burden of proof. It was, thus, the duty of the
examining division to provide evidence substantiating
its view that the claimed range for the refractive
index was indeed known from D3.

3.2.3   As regards the claimed feature that the thickness of
the transparent film is 64µm or less, it is observed
that D3 does not contain any indication concerning this
aspect, but merely emphasises that the said film is
provided in order to protect the acceptance surface of
the photo detector (cf. D3, paragraph [0010]). As
submitted by the appellant, dimensions obtained merely
by measuring a diagrammatic representation in a
document do not form part of the disclosure. The Board
thus concurs with the appellant that no technical
teaching regarding the thickness of the transparent
film can be derived from Figure 2 in D3. The
observation that the average distance between adjoining
fingerprint ridgelines may be considered to constitute
a fact and that it can be estimated to be about 100µm
does not affect the above finding since it can also not
be established with certainty that the elements of a
given figure are proportional to one another.

It follows that the fingerprint input device defined in
claim 1 differs from the device disclosed in
document D3 in that the refractive index of the
transparent solid film is 1.4 or more and in that said
film has a thickness of 64µm or less.

Since none of the other available prior art documents
discloses a fingerprint input device as recited in
claim 1 of the main request, its subject-matter is new
within the meaning of Article 54 EPC 1973.

3.3   *Inventive step (Article 56 EPC 1973)*

3.3.1   Although not sufficient to establish that the feature
        of the refractive index being 1.4 or more is known from
        document D3, the examining division's observation that
        normal glass fulfils the claimed condition is
        sufficient to deny the presence of an inventive step to
        the claimed range for the refractive index. It is,
        namely, considered that the skilled person would have
        selected, in the absence of any incentive in document
        D3 to do otherwise, standard glass compositions as
        commonly available when carrying out the invention as
        disclosed in D3. It is further emphasised, in this
        respect, that the glass compositions with refractive
        indexes below 1.4 referred to in paragraph [0017] of
        the published patent application are rare and costly
        products whose uses appear to be limited to specific
        industrial applications. The Board thus considers that
        the step of selecting a glass composition for the
        device of D3 would have very probably led to the
        selection of a glass fulfilling the claimed condition,
        even if the skilled person would have been unaware of
        the intrinsic qualities, in terms of contrast,
        associated with the selection actually made. In the
        Board's judgement, the claimed range of the refractive
        index would thus have resulted in an obvious manner,
        and independently of any specific problem to be solved
        other than mere reduction to practice, of the teaching
        of document D3.

A different conclusion would be tantamount to granting exclusive rights for the exercise of normal practice in the manufacturing of known entities and for the resulting products. This finding justifies, in the Board's view, not following the problem/solution approach under the present circumstances.

3.3.2 The Board is also unable to identify any inventive contribution in the selection of a thickness of 64μm or less for the transparent solid film.

A reduced thickness of the transparent film makes it possible to limit the interferences in terms of light intensity which result from light emanating from neighbouring fingerprint valley and ridgeline portions (cf. Figures 8 and 9 of the application as published) and reaching the same areas of the detector below said film. This detrimental effect results originally from the scattering taking place in the finger tissue.
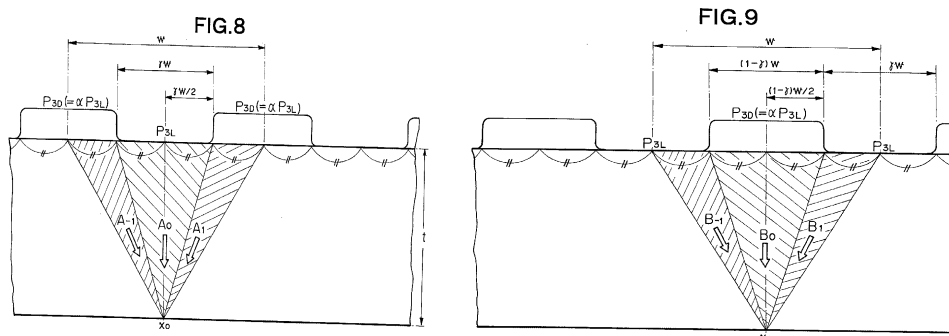

Figure 8: a typical view showing light received at a point X_0 right under the central point of a fingerprint ridgeline portion.

Figure 9: a typical view showing light received at a point X_1 right under the central point of a fingerprint valley portion.

The technical problem solved by this feature is thus to maintain a high level contrast at the two-dimensional image sensor. In other words, the interferences resulting from light emanating from neighbouring areas (cf. Fig. 8, 9) should be kept at a limited level.

In the Board's judgement, the skilled person would have recognised, independently of any model calculation, that the scattering of light taking place within the finger tissue would necessarily mean that the contrast of the image is negatively affected by the presence of the transparent solid film. He would have also immediately realised that this effect depends directly on the thickness of the film and that the thicker the film the more blurred the image.

This insight would have therefore led the skilled person to reduce the thickness of the transparent solid film as much as possible.

3.3.3   The appellant objected that document D3 actually taught away from a thin transparent film, since said film was intended to protect the underlying image sensor (cf. D3, paragraph [0010]). In the Board's view, however, the mere fact that the need for improved contrast of fingerprint images and the durability of the sensor conflict with each other would simply lead the skilled person to make a compromise between both aspects, thus selecting a range of thickness which reflects the manufacturer's priorities in terms of contrast and durability.

The Board disagrees with the appellant's view that there was a synergistic effect in the selection of the

two parameters, i.e. the refractive index and the thickness of the transparent film. While the feature regarding the refractive index makes it possible to discriminate, at the interface between finger and transparent film, between light transmitted directly from the finger and light transmitted via the air gap, the feature regarding the thickness of the transparent film addresses the problem of blurring of the image measured at the interface between the film and the image sensor, resulting from the **sole** presence of said transparent film. It follows that the effects obtained by the two distinguishing features, although both contributing to an improved image contrast, are not interrelated but concern two different aspects of the image elaboration process. The effect of limiting the impact of interferences between light emanating from neighbouring regions at the exit (lower) side of the transparent film is in fact independent of the process which leads to an optimisation of the contrast at the upper side of the transparent film. Further confirmation of this analysis may even be found in the approach developed by the applicant in the present application in order to determine satisfactory values for said two parameters. It is observed, in this respect, that the range of thicknesses providing a satisfactory contrast C_1 (below the transparent film) is determined on the basis of certain assumptions with regard to contrast C_0 (at the upper side of the transparent film), but independently of the calculations required for the determination of the refractive index n_3 for the transparent film.

3.3.4   In conclusion, the subject-matter of claim 1 of the main request results in an obvious manner from the

prior art as known from D3 and is therefore not inventive within the meaning of Article 56 EPC 1973.

The main request is therefore not allowable.

4.   *First auxiliary request*

Claim 1 of the first auxiliary request corresponds to claim 1 of the main request. Its subject-matter is therefore not inventive within the meaning of Article 56 EPC 1973, for the reasons set out above with regard to claim 1 of the main request.

The first auxiliary request is therefore not allowable either.

5.   *Second auxiliary request - admissibility*

5.1   Under Article 13(1) RPBA, a board has the discretion to admit and consider new requests presented by the appellant after it has filed its grounds of appeal. It exercises that discretion in view of *inter alia* the complexity of the new subject matter submitted, the state of the proceedings and the need for procedural economy.

New auxiliary request 2 was filed by the appellant during the oral proceedings before the Board following the debate on the main request and first auxiliary request. The appellant indicated that it had not expected that the main request and first auxiliary request would not be considered allowable and that it had a special interest in claims directed to the fingerprint input device as such.

5.2   The Board observes, firstly, that the appellant's
        argument is contradicted by the fact that the requests
        filed with letter of 13 February 2013 already included
        a second auxiliary request (renumbered as auxiliary
        request 3), thus establishing that the appellant had
        already considered the eventuality of the main request
        and first auxiliary request being rejected. Secondly,
        if the appellant's argument were considered to be valid,
        it would justify the endless filing of requests and
        consequently, vitiate Article 13(1) RPBA.

5.3   A criterion commonly applied by the boards of appeal
        when deciding on the admissibility of late requests
        under Article 13(1) RPBA is to determine whether the
        new requests overcome outstanding issues under the EPC
        and do not give rise to new objections (cf. Case law of
        the Boards of Appeal, 6th edition, VII.E, sections 16.4
        and 16.5).

        In the present circumstances, the Board notes that the
        introduction of method steps relating to the
        elaboration of the claimed fingerprint input device in
        the definition of the claimed device such as "*said
        fingerprint input device picks up ...*", "*the refractive
        index n_3 ... is set so as...*" leads to substantial
        problems of clarity under Article 84 EPC 1973. It is
        namely not clear from the current claims' wording which
        features as to the fingerprint input device actually
        result from those method steps.

        Moreover, in the absence from claim 1 of any clear
        structural limitation regarding the refractive index of
        the transparent solid film, the corresponding

distinguishing feature identified above in relation to claim 1 of the main request does not appear to be present in the claim's definition, thus leading to doubts as to whether the claimed subject-matter is new with regard to the teaching of document D3. This appears all the more true since claim 1 of the second auxiliary request does not recite any limitation with regard to the thickness of the transparent film, said aspect being addressed only in dependent claim 2.

Consequently, taking due account of the fact that new auxiliary request 2 raises new issues with regard to clarity and does not solve the problem of lack of inventive step raised with regard to claim 1 of the main request, the Board decides not to admit the second auxiliary request in the appeal proceedings.

6.   *Third auxiliary request*

6.1   Independent claims 1 and 3 of the third auxiliary request relate to a method for providing a fingerprint input device. In support of a claim to a method and with regard, more specifically, to the term "providing", the appellant referred, in its submissions of 13 February 2013, to the passage of the original description on page 4, lines 24-27, which reads: "*The present invention has been made in light of the above-stated problems. It is, therefore, an object of the present invention to provide a fingerprint input device capable of obtaining a fingerprint image presenting sufficient contrast*". The appellant further confirmed that, contrary to an interpretation on the part of the Board, it was not intended to obtain protection for a process of adapting the refractive index of the

transparent film and its thickness once the fingerprint had been manufactured. In this respect, the appellant further indicated that it would be prepared to replace the term "providing" by the term "manufacturing" or "producing".

There is, however, no support to be found in the original application documents for "*a method for providing a fingerprint input device*" when giving the words "*to provide*" the meaning of "to carry out". Whether the claimed methods are defined as "methods for providing" or "methods for producing" or "methods for manufacturing" is, in this respect, irrelevant. The passage cited by the appellant on page 4, lines 24-27, of the original disclosure is not a valid basis for the claimed method since "to provide" is used as a synonym not for producing or manufacturing but simply for disclosing. As a matter of fact, the original disclosure solely contains a detailed description of a model on the basis of which the refractive index and thickness of a transparent solid film may be determined in order to optimise the contrast of a fingerprint to be obtained. In other words, the description focuses on a mathematical elaboration process which makes it possible to identify the values of key parameters contributing to the contrast of the image generated by the two-dimensional image sensor. The description does not contain any information pertaining, as such, to the manufacturing of the fingerprint input device.

6.2   In the absence of any basis in the original application documents for a method for providing a fingerprint input device, claims 1-3 of the third auxiliary request infringe Article 123(2) EPC on added subject-matter.

The third auxiliary request is therefore not allowable.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar   The Chairman

R. Schumacher   H. Wolfrum