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D E C I S I O N
of 16 March 1999

Case Number: T 0385/96 - 3.4.2

Application Number: 86303246.2

Publication Number: 0203730

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Language of the proceedings: EN

Title of invention:
Anti-reflection optical article and process for preparation thereof

Patentee:
Toray Industries, Inc.

Opponent:
Nikon Corporation
Seiko Epson Corporation
Teruji Arai

Headword:
-

Relevant legal provisions:
EPC Art. 56, 84

Keyword:
"Inventive step - main request and subsidiary requests 1 to 9 (no)"

Decisions cited:
-

Catchword:

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Case Number: T 0385/96 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 16 March 1999

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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 8 March 1996 revoking European patent No. 0 203 730 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: E. Turrini
Members: S. V. Steinbrener
M. Lewenton

Summary of Facts and Submissions

I. The appellant (= proprietor of the patent) lodged an appeal against the decision of the Opposition Division revoking European patent No. 0 203 730.

Three oppositions had been filed against the patent as a whole and a part thereof, respectively. The oppositions had been based on Articles 100(a) and (b) EPC since the subject matter of the patent in suit allegedly lacked novelty or inventive step, and was insufficiently disclosed.

The Opposition Division held that the grounds for opposition mentioned in Article 100(a) EPC prejudiced the maintenance of the patent in that the subject matter of claim 1 in accordance with the main and auxiliary requests did not involve an inventive step when taking account of the following documents (using the numbering of the Opposition Division):

D1: DE-A-34 25 923

D2: US-A-4 410 563, and

D3: JP-A-58-136001 (and English translation thereof furnished by respondent 01 (= opponent 01) with its letter of 21 January 1997).

During the appeal proceedings, the respondents and the Board *inter alia* referred to the following further documents:

D4: CH-A-645 136

D5: JP-A-50-6615 (and English translation thereof furnished by respondent 01 with its letter of 21 January 1997)

D6: GB-A-2 064 987

D7: JP-A-58-122979 (and English translation thereof furnished by respondent 01 with its letter of 21 January 1997), and

D8: JP-A-51-1387 (and English translation thereof furnished by respondent 03 (= opponent 03) with its letter of 25 November 1996).

Of these further documents, documents D4 to D7 had already been cited before the first instance, and document D8 was submitted by respondent 03 with its reply to the statement of grounds of appeal.

II. By the letters of 25 August 1998 and 12 August 1998, respectively, respondents 01 and 02 (= opponent 02) withdrew their oppositions in the appeal phase.

III. In the communication of 8 October 1998 pursuant to Article 11(2) of the Rules of Procedure of the Boards of Appeal, the Board pointed out that in its provisional view the subject matter of claim 1 in accordance with the main request, i.e. claim 1 as granted, seemed to lack an inventive step when starting from the anti-reflection optical article disclosed in document D4 and taking account of the remaining prior art. Moreover, the Board expressed its doubts as to whether the additional limitations or the reformulations as use claim in accordance with the

subsidiary requests can render the claimed subject matter inventive.

IV. Oral proceedings attended by the remaining parties to the appeal proceedings, i.e. the appellant and respondent 03, took place on 16 March 1999. At the end of the oral proceedings, the Board's decision was pronounced.

V. The appellant requested that the decision under appeal be set aside and that the patent be maintained as granted (main request) or on the basis of subsidiary requests 1 to 5 as submitted with letter of 16 February 1999 and subsidiary requests 6 to 9 as presented during the oral proceedings, respectively.

VI. Respondent 03 requested that the appeal be dismissed.

VII. The wording of claim 1 according to the main request reads as follows:

"1. An anti-reflection optical article, which comprises a substrate carrying, formed thereon, a single-layer or multi-layer anti-reflection film of which the outermost layer is silicon dioxide deposited by a physical vapour deposition method, and a coating of an organic substance-containing curing substance formed on the surface of the anti-reflection film, wherein the surface reflectance of the optical article is lower than 3% and the stationary contact angle to water is at least 60°."

Claims 2 to 13 are appended to claim 1.

Independent claim 14 is worded as follows:

"14. A process for the preparation of anti-reflection optical articles, which comprises forming on the surface of a substrate an inorganic single-layer or multi-layer anti-reflection film, of which the outermost layer is silicon dioxide deposited by a physical vapour deposition method, coating a curable organic substance-containing substance consisting of a water-repellent liquid composition on the surface of the anti-reflection film, and curing the coating."

Claims 15 to 22 are dependent on claim 14.

VIII. The independent claims according to the first subsidiary request differ from those of the main request by the following modifications:
- insertion of "to a thickness of 0.001 to 0.3 µm" between "anti-reflection film" and ", wherein" in claim 1 of the main request; and
- substitution of "to provide a coating having a thickness of 0.001 to 0.3 µm" for "the coating" at the end of the process claim of the main request, the resulting claim being renumbered as claim 13.

Independent claims 1 and 10 of the second subsidiary request read as follows:
"1. An anti-reflection optical article, which comprises a substrate of plastics material carrying each of an anti-reflection film and, interposed between the anti-reflection film and the substrate, a hard coat layer, the anti-reflection film being a single-layer or multi-layer film formed on the substrate of which film the outermost layer is silicon dioxide deposited by a physical vapour deposition method, and a coating of an organic substance-containing cured substance selected

from an organic polysiloxane polymer and a fluorine-containing compound and formed on the surface of the anti-reflection film to a thickness of 0.001 to 0.3 µm, wherein the surface reflectance of the optical article is lower than 3% and the stationary contact angle to water is at least 60°."

"10. A process for the preparation of anti-reflection optical articles, which comprises forming on the surface of a substrate a hard coat layer and thereafter an inorganic single-layer or multi-layer anti-reflection film, of which the outermost layer is silicon dioxide deposited by a physical vapour deposition method, coating a curable organic substance-containing substance consisting of a water-repellent liquid composition selected from a polysiloxane composition and a fluorine-containing mixture on the surface of the anti-reflection film, and curing to provide a coating having a thickness of 0.001 to 0.3 µm."

In claims 1 and 10 of the third subsidiary request, the expressions "selected from ... fluorine-containing compound and" in claim 1 of the second subsidiary request and "selected from ... fluorine-containing mixture" in claim 10 of the second subsidiary request, respectively, have been replaced by "selected from alkyl-, alkenyl- and aryl-siloxane polymers and perfluoroalkyl group-containing (meth)acrylate homo and copolymers" and "comprising a curable organic compound selected from alkyl-, alkenyl- and aryl-siloxane polymers and perfluoroalkyl group-containing (meth)acrylate homo and copolymers".

The only independent claim of the fourth subsidiary request is worded as follows:

"1. Use of an organic substance-containing curing substance for the prevention of permanent staining of an anti-reflection optical article after contact thereof with an aqueous medium, which anti-reflection optical article comprises a substrate carrying, formed thereon, a single-layer or multi-layer anti-reflection film of which the outermost layer is silicon dioxide deposited by a physical vapour deposition method, the said organic substance-containing curing substance being formed and cured on the said outermost layer, whereby the said permanent staining is prevented, the surface reflectance of the optical article is lower than 3% and the stationary contact angle to water is at least 60°."

Claim 1 in accordance with the fifth subsidiary request differs from claim 1 according to the fourth subsidiary request by the addition of "to form a coating having a thickness of 0.001 to 0.3 µm" after "cured".

Claim 1 of the sixth subsidiary request reads as follows:

"1. Use of an organic substance-containing curing substance for the prevention of permanent staining of an anti-reflection optical article after contact thereof with an aqueous medium, which anti-reflection optical article comprises a substrate of plastics material carrying, formed thereon, each of an anti-reflection film and, interposed between the anti-reflection film and the substrate, a hard coat layer, the anti-reflection film being a single-layer or multi-layer anti-reflection film of which the outermost layer

is silicon dioxide deposited by a physical vapour deposition method, the said organic substance-containing curing substance being selected from an organic polysiloxane polymer and a fluorine-containing compound and being formed and cured to form a coating having a thickness of 0.001 to 0.3 µm on the said outermost layer, whereby the said permanent staining is prevented, the surface reflectance of the optical article is lower than 3% and the stationary contact angle to water is at least 60°."

Finally, claims 1 of the respective remaining subsidiary requests are worded as follows:

Seventh subsidiary request

"1. Use of an organic substance-containing curing substance for the prevention of permanent staining of an anti-reflection optical article after contact thereof with an aqueous medium, which anti-reflection optical article comprises a substrate of plastics material carrying, formed thereon, each of an anti-reflection film and, interposed between the anti-reflection film and the substrate, a hard coat layer, the anti-reflection film being a single-layer or multi-layer anti-reflection film of which the outermost layer is silicon dioxide deposited by a physical vapour deposition method, the said organic substance-containing curing substance being selected from alkyl-, alkenyl- and aryl-siloxane polymers and perfluoro group-containing (meth)acrylate homo and copolymers and being formed and cured to form a coating having a thickness of 0.001 to 0.3 µm on the said outermost layer, whereby the said permanent staining is prevented, the surface reflectance of the optical

article is lower than 3% and the stationary contact angle to water is at least 60°."

Eighth subsidiary request

"1. Use of an organic substance-containing curing substance for the prevention of permanent staining of an anti-reflection optical article after contact thereof with an aqueous medium, which anti-reflection optical article comprises a substrate of plastics material carrying, formed thereon, each of an anti-reflection film and, interposed between the anti-reflection film and the substrate, a hard coat layer, the anti-reflection film being a single-layer or multi-layer anti-reflection film of which the outermost layer is silicon dioxide deposited by a physical vapour deposition method, the said organic substance-containing curing substance being selected from an organic polysiloxane polymer and a fluorine-containing compound and being formed and cured to form a coating having a thickness of 0.001 to 0.3 µm on the said outermost layer, whereby the said permanent staining is prevented such that when the optical article is rubbed 20 times with paper impregnated with acetone and 5 ml of city water is allowed to stand still on a surface of the optical article in a room temperature atmosphere for 48 hours, and thereafter wiped with a cloth, no residual fur remains, the surface reflectance of the optical article is lower than 3% and the stationary contact angle to water is at least 60°."

Ninth subsidiary request

"1. Use of an organic substance-containing curing substance for the prevention of permanent staining of an anti-reflection optical article after contact thereof with an aqueous medium, which anti-reflection

optical article comprises a substrate of plastics material carrying, formed thereon, each of an anti-reflection film and, interposed between the anti-reflection film and the substrate, a hard coat layer, the anti-reflection film being a single-layer or multi-layer anti-reflection film of which the outermost layer is silicon dioxide deposited by a physical vapour deposition method, the said organic substance-containing curing substance being selected from alkyl-, alkenyl- and aryl-siloxane polymers and perfluoro group-containing (meth)acrylate homo and copolymers and being formed and cured to form a coating having a thickness of 0.001 to 0.3 µm on the said outermost layer, whereby the said permanent staining is prevented such that when the optical article is rubbed 20 times with paper impregnated with acetone and 5 ml of city water is allowed to stand still on a surface of the optical article in a room temperature atmosphere for 48 hours, and thereafter wiped with a cloth, no residual fur remains, the surface reflectance of the optical article is lower than 3% and the stationary contact angle to water is at least 60°."

In the above wording, an obvious mistake ("3 µm" instead of "0.3 µm") has been corrected by the Board in claims 1 of the sixth to ninth subsidiary requests.

IX. The appellant's argument in support of its requests may be summarised as follows:

Having regard to the subject matter of claim 1 according to the main request, document D4 seems to be a legitimate starting point since this prior art already discloses an anti-reflection optical article

having an anti-reflection film, the outermost layer of which consists of PVD silicon dioxide. As is known from document D3, PVD silicon dioxide stains easily. Therefore, with respect to document D4, the technical problem may be seen in achieving long term resistance to staining, which means that tests (d) and (f) defined in the specification of the patent in suit must be passed by the protective coating. In this context, it has to be emphasised that said tests are not related to simple water repellency.

Although cured protective coatings may have been described in the remaining prior art, a skilled person would not take such coatings seriously into consideration for various reasons:

Document D2 suggests the use of cured organic coatings on glass, MgF_2 and ITO in order to avoid distortion of vision and impact of salt water on the coating. Neither of the two problems are sought to be solved in the contested patent which relates to long term water resistance. This problem is not in any way addressed by D2. A prior art document which actually deals with the above staining problem of SiO_2 coatings is document D3 which however suggests an entirely different solution, namely the application of a metal nitride coating. In consequence, there is a clear teaching alternative to D2 so that a one-way-street situation does not arise. This argument holds even if the problem addressed by the patent in suit had been one of water repellency since the skilled reader had many water repellent coating compositions to choose from as alternatives to those in D2.

In document D6, there is a lot of general disclosure, however, what is actually taught is the use of a similar material as a protective coating on a film consisting already of a cured organic substance including colloidal silicon dioxide particles. Thus, in D6 there is no entirely inorganic underlayer as in the contested patent.

Document D7 uses the protective coating on glass which is much less sensitive to water staining than SiO_2. According to D7, the -Si-O-R groups of the protective coating are hydrolysed in the presence of water in analogy to document D2 where a durable polymeric coating bonded to the surface is also obtained by hydrolysis and condensation reactions in the presence of water at the surface to be coated. Therefore, the prior art teachings would not attract a skilled person in the case of PVD SiO_2 where water must be completely dispelled as can be seen from document D3.

Documents D5 and D8 do not necessarily provide a curing operation and relate to coating of glass which also physically differs considerably from PVD SiO_2 by its much smoother surface structure.

Finally, the history of the ophthalmic lens as outlined by respondent 01 in its letter dated 21 January 1997 shows that unprotected plastic lenses were on sale from 1982 onwards so that in view of the unpleasant and urgent staining problem and its solution only in 1985 by the patent in suit a long felt want should be accepted.

Claim 1 of the first subsidiary request specifies the

protective coating to be a relatively thin layer. It must be considered surprising that a coherent film can still be obtained at such low thicknesses on the rough PVD SiO_2 surface.

In claim 1 of the second subsidiary request, a hard coating is provided between a plastics lens and the anti-reflection film. Although hard coatings as such are known in the art (see e.g. document D1), it is entirely surprising that only with the hard coating the long term staining test is passed. Furthermore, the preferred type of organic material for the protective coating has been specified in claim 1 of the second subsidiary request.

The most preferred polymers of the patent specification have then been included in claim 1 of the third subsidiary request. All of these materials are not explicitly disclosed in the prior art for the particular purpose.

Finally, subsidiary requests 4 to 9 are limited to the actual use of the protective coatings for the prevention of permanent staining, which use is not suggested in the available prior art. The last two subsidiary requests additionally include the tests applied in this context as a new piece of information to the public.

X. Respondent 03 advanced the following counterarguments:

The appellant's arguments are not convincing because the claims do not reflect these arguments. The subject matter of claim 1 according to the main request only

differs from the prior art as described in document D4 by the provision of a curing substance. In particular, the prior art silicone oils were well-known to be water repellent. Document D2 addresses a closely related problem and therefore constitutes a very relevant document for long term durability as well. Furthermore, document D2 imparts a teaching of how to improve the long term properties of coated lenses. The known solution consists in using different silanes and siloxanes which are reactive with the aid of specific groups and curing agents so that cross-linked polymers are obtained, the polymers forming coatings more adherent to the lens surface. The grainy structure of PVD SiO_2 easily attracts the water necessary for the hydrolysis and condensation reactions and would thus give an additional incentive to a skilled person for applying the teaching of D2. The long-felt need argument which could at best form a secondary indicator, does not hold in the present case since a period of three or four years must be considered to be a normal period of research and development in the technical field concerned.

Moreover, the specific tests referred to by the appellant cannot render the article inventive if the article as such is obvious.

Having regard to the subsidiary requests, the thickness values are conventional (see e.g. document D6 in this context). The lower thickness limit seems to be trivial in that it means that at least a mono-molecular layer should be formed. Similarly, as can be seen from document D1, a hard coat layer would be provided without exercising inventive skill. The special

selection of curing substances is, e.g., known from document D2. Claim 1 according to the third subsidiary request is not clear in that the curing compositions are not well-defined and the curing groups are not mentioned. If the claim relates to four alternative possibilities as the appellant asserts, then the first alternative (alkyl-siloxane polymers) is based on normal silicone oils known from document D4 which may be subject to various cross-linking reactions, e.g. by using reactive groups for cross-linking disclosed in document D2. Thus, the more limited device claims according to the first type of subsidiary requests only relate to an accumulation of *per se* known features without synergetic effect.

The claimed use for prevention of staining cannot render the articles inventive since this use is either obvious or relates to a bonus effect automatically obtained as has been rightly pointed out by the Opposition Division. Nor can an invention be seen in the specification of the tests which are a necessary supplement to explain the meaning of "stain resistance".

Reasons for the Decision

1. *Admissibility of Appeal*

The appeal is admissible.

2. *Articles 123 and 84 EPC*

The Board considers the amended versions of claims according to the subsidiary requests to be admissible and sufficiently clear to meet the requirements of Articles 123 and 84 EPC, respectively.

The clarity objection raised by respondent 03 against the wording of claim 1 of the third auxiliary request does not seem to be justified since the expression "selected from ..." in the present context simply means the selection of "at least one substance out of a set of alternative substances" as the appellant has rightly pointed out. This interpretation is consistent with the meaning of the same expression in claim 1 of the second subsidiary request and the corresponding passage of the patent specification (see page 5, lines 42 to 57).

3. *Article 54 EPC*

The Board holds the view that the claimed subject matter is novel with respect to the prior art identified. In fact, novelty has not been at issue in the present appeal proceedings.

4. *Article 56 EPC*

4.1 Main request

4.1.1 There was general consent at the oral proceedings that the prior art described in document D4 comes closest to the subject matter of claim 1 as granted.

This document already relates to an anti-reflection optical article which comprises a substrate carrying, formed thereon, a single-layer or multi-layer anti-reflection film of which the outermost layer is silicon dioxide deposited by a physical vapour deposition method, and a coating of an organic substance-containing substance formed on the surface of the anti-reflection film, wherein the surface reflectance of the optical article is lower than 3% (see D4, page 3, left-hand column, lines 7 to 54). Since the prior art coating is explicitly described as being water repellent, it must be assumed that the stationary contact angle to water is also at least 60° in the prior art (see in this context e.g. document D5, page 8, first paragraph of the English translation or page 5, lines 35 to 41 of the contested patent).

Therefore, the claimed subject matter differs from the prior art only in that the "organic substance-containing substance" is of the curing type whereas D4 refers to silicone oil, the reactive properties of which are not specified. However, silicone oils normally are fluids which do not cure in the sense of forming stable cross-linked resins, but remain volatile (see D4, page 3, left-hand column, lines 46 to 54 and page 4, right-hand column, lines 7 to 9).

4.1.2 In this context, it should be mentioned that a water repellent top coating as already employed in document D4 is highly desirable for anti-reflection films having an outermost layer of SiO_2 since this material is easily stained by various contaminants, in particular by water droplets (see e.g. document D3, page 2, last paragraph to page 3, second paragraph of the English translation or D8, page 1, penultimate paragraph to page 2; page 3, second paragraph; and page 5, second paragraph of the English translation). In addition, these stains are difficult to remove.

Moreover, since a skilled person should be well aware of the fact that water repellency is closely linked to the general aspect of stain prevention (see e.g. document D5, page 8, last paragraph - page 9 of the English translation or D7, page 2, penultimate paragraph to page 3, penultimate paragraph of the English translation), the Board comes to the conclusion that the coating with silicone oil provided in document D4 would already be understood to serve the joint purpose of water repellency and stain prevention, albeit on a temporary basis only (see also document D7, page 3, first and second paragraph of the English translation).

Hence, the technical problem to be solved by the claimed subject matter may be seen in an attempt to improve the coating durability (see page 2, lines 42 to 44 of the patent in suit in this context).

4.1.3 In the Board's view, use of organic curing substances as a solution to the above problem is well-established in the technical field concerned. Such protective

coatings have, e.g., been employed on uncoated glass substrates, in particular as a substitute for silicone oils (see document D2, column 1, line 20 to column 3, line 36 and column 5, lines 5 to 44; document D7, page 3 to page 6, first paragraph of the English translation), on magnesium fluoride coatings (see document D2, column 1, line 20 to column 3, line 36 and column 5, lines 5 to 44), on indium-tin oxide coatings (see document D2, column 1, line 20 to column 3, line 36 and column 5, lines 5 to 44), and on anti-reflection coatings consisting of an organic base material in which a finely divided particulate inorganic substance is dispersed (see document D6, page 3, lines 15 to 20 and page 4, line 59 to page 5, line 32).

On a *prima facie* basis, it must therefore be assumed that the mere existence in the prior art of a broad application of organic curing substances as protective coatings on different materials for reasons of improving the coating durability should give a strong incentive to a skilled person to try such substances as more durable substitutes for silicone oil in the case of an optical article according to D4 as well.

4.1.4 The appellant's arguments as to why a skilled person would refrain from making such an attempt are not convincing in the Board's opinion:

Although the specific water-stain problem of silicon dioxide is not addressed in document D2, this document clearly relates to the aspect of improving the coating durability (see document D2, column 1, lines 35 to 41 and column 5, lines 40 to 44).

Neither are SiO_2 layers excluded as undercoatings in the prior art nor are the prior art applications restricted to the materials cited above (see document D2, column 1, lines 14 to 19 and 27 to 30 referring rather generally to antireflective coatings).

Even if SiO_2 coatings are more sensitive to water staining than glass surfaces, as the appellant asserts, the basic staining problem has also been reported for glass (see document D7, page 2, last paragraph to page 3, first paragraph of the English translation) which generally constitutes a material closely related to silicon dioxide (see document D8, page 5, second paragraph of the English translation).

Contrary to the appellant's opinion, the Board holds the view that a skilled person would not be prevented from utilising curing substances on an SiO_2 surface, which substances involve hydrolysis in the presence of water bonded to the optical article surface as proposed in documents D2 (see column 2, lines 27 to 62) and D7 (see page 4, first paragraph of the English translation) since such water films can only be avoided by specific measures (see document D4, page 2, right-hand column, lines 28 to 50) and therefore must be expected to normally also exist on the rather rough and hygroscopic PVD SiO_2 surface (see document D3, page 3, second paragraph of the English translation). Moreover, a broad variety of organic curing substances not relying on the presence of water is available from document D6 (see page 5, lines 8 to 12).

Finally, the existence of a different solution to the water staining problem in the prior art (see document

D3) cannot be considered to form a barrier excluding any further alternative attempts nor does a period of three to four years seem to be sufficient to prove a long felt want in the present case. As can be seen from the time scale submitted by respondent 01 (see the letter dated 21 January 1997), such a period rather constitutes a typical time constant for the normal progress in ophthalmic lens technology.

4.1.5 In consequence, the subject matter of claim 1 according to the main request does not involve the inventive step required by Article 56 EPC, and claim 1 is not allowable for this reason.

For reasons analogous to those given above with respect to claim 1, process claim 14 is also not allowable (Article 56 EPC).

4.2 First to third subsidiary requests

4.2.1 In the Board's view, the limitations introduced into the independent claims according to the first to third subsidiary requests cannot lead to patentability of the claimed subject matter.

4.2.2 The additional specification of the coating thickness according to the first subsidiary request falls within the competence of a skilled person when using conventional curing substances for an optical article of the type disclosed in document D4.

Obviously, thickness design is governed by the requirements that a sufficient protection is to be achieved without substantially interfering with the

anti-reflection properties of the undercoating (see e.g. document D6, page 5, lines 19 to 23 or document D3, page 6 to page 7, second paragraph of the English translation). The lower limit would in any case be the thickness of a mono-molecular layer which seems to correspond to the claimed lower limit of 0.001 µm. Whether such a thin layer can still be considered to be continuous, appears doubtful in the Board's opinion. Moreover, as respondent 01 has pointed out in its letter dated 21 January 1997, the claimed thickness range overlaps with conventional ranges disclosed in document D6 (see page 5, line 20), assuming standard densities for the resins suggested in D6.

4.2.3 In accordance with the second and third subsidiary requests, the claimed subject matter has been further restricted (with respect to the first subsidiary request) to an optical article having a hard coat layer between the anti-reflection film and the substrate of plastics material. Moreover, the organic curing substance for the protective coating is selected from either

- an organic polysiloxane polymer and a fluorine-containing compound (second subsidiary request), or
- alkyl-, alkenyl- and aryl-siloxane polymers and perfluoroalkyl group-containing (meth)acrylate homo and copolymers (third subsidiary request).

The first additional feature relates to the entirely independent aspect of improving the scratch resistance of a relatively soft plastic substrate and constitutes a conventional measure in the art (see e.g. document D6, page 1, lines 34 to 38; document D3, page 1, last paragraph to page 2, penultimate paragraph; or document

D1, page 4, lines 6 to 16). Since a plastic substrate is already disclosed in document D4 (see e.g. page 3, left-hand column, lines 46 to 54), a skilled person would consider the application of an additional hard coat layer for scratch prevention without exercising inventive skill. In this case, it should be expected that the overall scratch resistance of the article is improved, in particular if the protective coating is very thin.

Neither do the above specific curing substances seem to make any contribution to patentability. Firstly, it must be concluded from the patent in suit that the selection of such materials is not particularly critical (see page 5, lines 42 to 43). Secondly, the substances specified comprise typical examples of curing substances already considered for protective coatings in the prior art, i.e. organic polysiloxane polymers and fluorine-containing compounds in general and alkyl-siloxane polymers in particular (see D2, column 2, lines 27 to 62; D7, page 3, last paragraph, to page 4, first paragraph of the English translation). Therefore, when putting the prior art teaching to practice, it must be assumed that a skilled person would naturally rely on these known substances and thereby arrive at the claimed subject matter.

4.2.4 In consequence, the independent claims of the first to third subsidiary requests are not allowable in view of Article 56 EPC.

4.3 Fourth to ninth subsidiary requests

4.3.1 The fourth to seventh subsidiary requests relate to the

use of an organic curing substance for the prevention of permanent water-staining of an anti-reflection optical article according to the main request and first to third subsidiary requests, respectively.

4.3.2 As has been pointed out in the preceding paragraphs, the Board considers such an article to be rendered obvious by the prior art identified. Moreover, it has already been emphasised above (see item 4.1.2) that the effects of water repellency and stain prevention are closely interrelated so that a solution achieving one effect would obviously also achieve the other effect. Since the technical contribution of the use of an organic curing substance over the closest prior art as set out in document D4 mainly consists in an increased durability of the protective coating, a skilled person would also expect an increased durability of both effects associated with said use. Furthermore, the achievement of long-term stain resistance (apparently including water-stains as well) by using organic curing substances as protective coatings has explicitly been disclosed in document D7 (see page 2, last paragraph to page 4, first paragraph of the English translation).

4.3.3 Finally, claims 1 of the eighth and ninth subsidiary requests differ from the corresponding claims of the sixth and seventh subsidiary requests in that the test conditions for assessing stain prevention have been specified. According to these conditions, the protective layer is mechanically and chemically worked (rubbing with paper impregnated with acetone), and then removal of a dried water droplet is tested. Similar mechanical and chemical tests have been described in the prior art for the same purpose (see document D6,

page 12, line 45 to page 13, line 20). In the Board's view, no inventive merit can be seen in defining the claimed details of the test which a skilled person would have to find out anyhow on the basis of its general knowledge in accordance with the preceding subsidiary requests. In particular, it seems obvious to perform a stain removal test on the protective coating after mechanical rubbing and application of standard solvents in order to assess the coating's durability (see also document D8, page 3, second paragraph of the English translation in this context).

4.3.4 In consequence, the use claims according to the fourth to ninth subsidiary request are also not allowable in view of Article 56 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

P. Martorana E. Turrini