Patent Right	Date	October 31, 2022	Court	Intellectual Property High Court, Fourth Division
	Case number	2021 (Gyo-Ke) 10085		
- A case in which the court held that there was no error in a decision made by the JPO regarding its findings of the primary prior art and of the common features and differences between the primary prior art and the invention claimed by the patent in question (the Invention), but that there was an error in the determination by the JPO regarding whether the Invention could have been easily conceived of by a person skilled in the art. - A case in which the court held that there was an error in the JPO decision to the effect that the Invention does not satisfy the support requirement.				

Case type: Rescission of Trial Decision of Invalidation

Result: Granted

References: Article 29, paragraph (2) and Article 36, paragraph (6), item (i) of the Patent Act

Related rights, etc.: Invalidation Trial No. 2020-800013, Patent No. 4466883

Summary of the Judgment

No. 1 Outline of the case

1. History of the procedures at the Japan Patent Office (JPO)

(1) On October 31, 2007, the Plaintiff filed a new application (Patent Application No. 2007-283059; hereinafter referred to as the "Application") for an invention titled "Printed retroreflective sheet" by dividing part of a patent application filed on April 10, 2000 (Patent Application No. 2000-108636). On March 5, 2010, the Plaintiff obtained a registration establishing a patent right (Patent No. 4466883; the number of claims: 4; hereinafter referred to as the "Patent").

(2) On February 13, 2020, the Defendant filed a request for a patent invalidation trial to seek invalidation of the Patent (Invalidation Trial No. 2020-800013). As of February 5, 2021, the Plaintiff filed a request for correction to correct Claims 1 and 2 and delete Claims 3 and 4 among Claims 1 to 4, which form a group of claims, and to correct the statement of paragraph [0016] in the description attached to the written application of the Application (the description including the drawings is hereinafter referred to as the "Description") (these corrections are collectively referred to as the "Correction").

On June 16, 2021, the JPO approved the Correction and rendered a decision to the effect that the patent for the inventions described in Claims 1 and 2 of Patent No.

4466883 shall be invalidated (hereinafter referred to as the "JPO Decision"). The certified copy of the JPO Decision was served upon the Plaintiff on June 24, 2021.
(3) On July 21, 2021, the Plaintiff filed this suit to seek rescission of the JPO Decision.
2. Summary of the JPO Decision
(1) The invention relevant to Claim 1 of the Patent ("Invention 1") and the invention relevant to Claim 2 of the Patent ("Invention 2") could have been easily made by a person skilled in the art based on the invention disclosed in the description of Publication of United Kingdom Patent Application No. 2171335 (Exhibit Ko 1 Document) and the art disclosed in Publication of Japanese Patent Application No. 1999-305018 (Exhibit Ko 3), both of which fall within the category of publications distributed in Japan or in a foreign country prior to the filing of the Application, as well as based on well-known art. Therefore, Invention 1 and Invention 2 are unpatentable pursuant to Article 29, paragraph (2) of the Patent Act.
(2) Invention 1 and Invention 2 could have been easily made by a person skilled in the art based on the inventions (Exhibit Ko 2 Invention A and Exhibit Ko 2 Invention B) disclosed in the description of West German Patent Application No. 2118822 (Exhibit Ko 2 Document), which falls within the category of publications distributed in Japan or in a foreign country prior to the filing of the Application, and based on well-known art. Therefore, Invention 1 and Invention 2 are unpatentable pursuant to Article 29, paragraph (2) of the Patent Act.
(3) Since the Invention cannot be deemed to be stated in the detailed explanation of the invention, the statements of the claims of the Patent do not satisfy the requirement prescribed in Article 36, paragraph (6), item (i) of the Patent Act.
No. 2 Summary of the court decision

This case involves a wide range of issues. The sections below provide a summary of the court decision regarding [i] the error in the determination on whether Invention 1 could have been easily conceived of based on Exhibit Ko 1 Invention as the primary prior art, and [ii] the error in the determination on the violation of the support requirement.

1. Error in the determination on whether Invention 1 could have been easily conceived of based on Exhibit Ko 1 Invention as the primary prior art
(1) The Invention is intended to solve the problem with prior art, that is, poor weather resistance and water resistance in the case where a printing layer is provided on a triangular pyramidal cube corner retroreflective sheet or a vapor deposition type triangular pyramidal cube corner retroreflective sheet, etc. in order to improve the hue of these sheets. Its technical significance exists in providing a retroreflective sheet with

the following features: [i] polycarbonate resin is used for the reflective element layer and (meth) acrylic resin is used for the surface protective layer; [ii] the printing layer is installed between the holder layer and the surface protective layer in a manner that the printing layer makes contact with the holder layer and the surface protective layer; [iii] the printing layer and the printing area that forms an independent area are arranged in a repeating pattern, and do not form a continuous layer, with the area of the independent printing area being 0.15 mm^2 to 30 mm^2; [iv] the printing layer contains titanium oxide as a white inorganic pigment. In consideration of the difference between the structures of the examples and the comparative examples disclosed in the Description and the test results ([0079]), the features mentioned in [ii] and [iii] can be regarded as structures that are indispensable for solving the problem.

It then follows that it is inappropriate to examine whether the Invention could have been easily conceived of by focusing separately on Differences 1-1 and 1-4 relating to features [ii] and [iii], but rather these features should be examined as forming a single structure.

(2) A. The structure of Exhibit Ko 1 Invention comprises "a backing 10 made of plastic," "a first layer 12 made of retroreflective material on one side of the plastic backing 10," "a second layer 14 made of retroreflective material" over the first layer 12, glass microspheres 16 that are firmly fixed and partly embedded in the second layer 14, and a cover layer 18. Part of the cover layer 18 is colored white, and the white coloration is printed on one or both sides of the cover layer 18. The cover layer 18 is not attached to the assembly except adjacent to the edges of the piece of material, or in other words, there is a space between the cover layer 18 and the glass microspheres 16. The space between the printing layer and the glass microspheres 16 forms a path of light of retroreflection by deflecting the light with the interface between the air in the space and the glass microspheres (page 3 of the Defendant's brief; the same in the JPO Decision). With regard to such a retroreflective sheet, the first layer and the second layer, which are made of retroreflective material, the microspheres attached thereon, and the cover layer partially printed in white, can be understood as constituting a single technical idea, that is, retroreflective material that reflects the incident light from the headlights of vehicles at night and appears white in daylight, which is the purpose of Exhibit Ko 1 Invention.

Thus, Exhibit Ko 1 Invention has a structure wherein there is a space between the cover layer 18 with the printing layer that is colored in white on one or both sides of the cover layer 18 in a uniform pattern of multiple dots, and the microspheres 16, and the cover layer 18 is not attached to the assembly except adjacent to the edges of the

piece of material. The space is provided to form a path of light of retroreflection. Therefore, a person skilled in the art who has come across Exhibit Ko 1 Invention is unable to recognize the problem of decline in retroreflectivity due to, for example, a blister in the printing layer caused by water, etc. penetrating into the space between the printing layer and the second layer 14. There is no motivation, on the assumption of such problem, to apply the art disclosed in Exhibit Ko 3 ("triangular pyramidal cube corner retroreflective sheet which comprises, in the order from the incident direction of light (10), the surface protective layer (4), the printing layer (5) for communicating information to the observer or coloring the sheet, the bonding material layer (6) for achieving the sealing structure to prevent water from penetrating into the back side of the reflective element layer, the air layer (3) surrounded by the reflective element layer (1) and the bonding material layer (6) which is for guaranteeing retroreflection with the interface of the reflective element, the holder layer (7) that supports the bonding material layer (6), and the adhesive agent layer (8) and the separating agent layer (9) that are used to attach the retroreflective sheet to another structure").

B. In addition, how to increase the retroreflective efficiency of retroreflective material is a well-known problem. Even though it is known that a cube corner retroreflective element has greater retroreflective efficiency than an element using micro glass spheres, the cover layer 18 and the printing layer that is colored in white on one or both sides of the cover layer 18 in a uniform pattern of multiple dots, which are contained in Exhibit Ko 1 Invention, are structured based on the structure using glass microspheres in a manner that they do not obscure or attenuate more than a limited amount of the retroreflectivity at night and sufficient white color is present such that they appear white in daylight (page 1, lines 115 to 123). Therefore, there is no motivation to maintain such structure of the cover layer 18 and the printing layer that is colored white and extract only the layer structure that is present between the printing layer and the backing 10, and then replace it with the layer structure based on the art disclosed in Exhibit Ko 3, which comprises triangular pyramidal cube corner retroreflective material, the air layer, and the bonding material layer.

C. Even if it is assumed that with regard to the "space, glass microspheres, second layer 14, and first layer 12," which are among the structures of Exhibit Ko 1 Invention, there is motivation to apply the structures of "bonding material layer (6), air layer (3), triangular pyramidal retroreflective element layer (1), and holder layer (3)," which are among the structures of the art disclosed in Exhibit Ko 3, there is no evidence to find that the cover layer 18 can be structured in a manner that it makes contact with the holder layer.

(3) As explained above, there is no motivation to apply the art disclosed in Exhibit Ko 3 to Exhibit Ko 1 Invention, and even if there is any such motivation, a person skilled in the art would not be able to conceive of the structure wherein "the printing layer is installed between the holder layer and the surface protective layer in a manner that the printing layer makes contact with the holder layer and the surface protective layer" (Difference 1-1).

Accordingly, there is no motivation for a person skilled in the art to recognize problems such as a blister in the printing layer due to the installation of the printing layer between the holder layer and the surface protective layer and examine the area ratio of the independent printing area based on such recognition, and hence such person would not be able to conceive of the structure regarding Difference 1-4.

2. Error in the determination on the violation of the support requirement

(1) Taking into account all of the statements in the Description, it is found that the Invention provides a retroreflective sheet with improved hue which solves the defect of prior art—poor weather resistance and water resistance in the case where a printing layer is provided on a triangular pyramidal cube corner retroreflective sheet or a vapor deposition type triangular pyramidal cube corner retroreflective sheet in order to improve the hue of these sheets—by employing a very simple and inexpensive method.

(2) According to the detailed explanation of the invention contained in the Description, the Invention can be regarded as an invention stated in the detailed explanation of the invention.

In addition, in light of the layered structure indicated in Figure 1, Examples 1 to 3 contained in the Description comprise a "reflective element layer consisting of a reflective element and a holder layer" and a "surface protective layer installed on the reflective element layer" and a printing layer is installed between the holder layer and the surface protective layer. As Figure 4 (unlike Figure 6) shows that printing areas are arranged in a zigzag, "the printing area forms an independent area and is arranged in a repeating pattern," and it "does not form a continuous layer." The area of the independent printing area is 1 mm^2 in Examples 1 and 2, and 0.25 mm^2 in Example 3. The printing layer is a retroreflective sheet of 2 μm in thickness which is printed using pigments such as titanium oxide ([0061]). In these examples, there was no abnormality in terms of retroreflectivity and the appearance after the weather resistance test, whereas in the comparative examples (the pattern without an independent printing area in Figure 6), the generation of a blister in the printing layer was disclosed.

In view of the statements in individual paragraphs in the Description and the results of the comparative tests above, it can be said that the detailed explanation of the

invention contained in the Description provides the disclosure to the extent that a person skilled in the art would be able to recognize that the retroreflective sheet that satisfies the matters specifying the Invention can solve the problem targeted by the Invention.
(3) The JPO found that with regard to the layered structure of the "holder layer," "surface protective layer" and "printing layer," the "claims" of the Invention only state that "the printing layer is installed between the holder layer and the surface protective layer in a manner that the printing layer makes contact with the holder layer and the surface protective layer" and there is no statement specifying whether the "holder layer" makes contact with the "surface protective layer." On these grounds, the JPO determined that the scope of the Invention includes a retroreflective sheet that lacks the structure wherein the "holder layer" and the "surface protective layer" are bonded together with a width where adhesion is secured.

However, as the Invention relates to a retroreflective sheet used for road signs, construction signs, and other signs, and number plates for vehicles such as automobiles and motorcycles ([0002]), it can be said that the Invention is necessarily supposed to be used outside, and it can also be said that requiring a certain degree of weather resistance for a retroreflective sheet is in itself common general technical knowledge. The Description states that in order to improve the hue of the conventional type of retroreflective sheet, attempts have been made to provide a continuous printing layer on a part of a retroreflective sheet, but the printing layer has defects such that its adhesion with the surface protective layer is slightly inferior, a blister is generated in the weather resistance test and it is easy to absorb water ([0008][0009][0012]). In light of these circumstances, it is unreasonable to consider that the scope of the "claims" of the Invention includes a retroreflective sheet that lacks the structure wherein the "holder layer" and the "surface protective layer" are bonded together with a width where adhesion is secured only because the "claims" do not contain a statement specifying whether the holder layer and the surface protective layer make contact with each other. Rather, it should be considered that the adhesion between these layers is taken as a given (even in light of the terms, "surface protective layer" and "holder layer," and their nature, it is difficult to assume that these layers are bonded purposefully with a width where adhesion is not secured).

Judgment rendered on October 31, 2022
2021 (Gyo-Ke) 10085, Case of seeking rescission of the JPO decision
Date of conclusion of oral argument: September 12, 2022

Judgment

Plaintiff: Nippon Carbide Industries, Co., Inc.

Defendant: 3M Innovative Properties Company
Defendant: 3M Japan Innovation Limited

Main text

1. The decision made by the Japan Patent Office (JPO) on June 16, 2021, concerning the case of Invalidation Trial No. 2020-800013, shall be rescinded.
2. The Defendants shall bear the court costs.
3. The additional time frame for final appeal and for petition for acceptance of final appeal against this judgment shall be thirty days.

Facts and reasons

No. 1 Claim

Same as paragraph 1 of the main text.

No. 2 Outline of the case

1. Outline of procedures at the JPO (There are no disputes between the parties.)

(1) On October 31, 2007, the Plaintiff filed a new application (Patent Application No. 2007-283059; hereinafter referred to as the "Application") for an invention titled "Printed retroreflective sheet" by dividing part of a patent application filed on April 10, 2000 (Patent Application No. 2000-108636). On March 5, 2010, the Plaintiff obtained a registration establishing a patent right (Patent No. 4466883; the number of claims: 4; hereinafter referred to as the "Patent").

(2) On February 13, 2020, the Defendant filed a request for a patent invalidation trial to seek invalidation of the Patent (Invalidation Trial No. 2020-800013).

As of February 5, 2021, the Plaintiff filed a request for correction to correct Claims 1 and 2 and delete Claims 3 and 4 among Claims 1 to 4, which form a group of claims, and to correct the statement of paragraph [0016] in the description attached to the written application of the Application (the description including the drawings is hereinafter referred to as the "Description") (these corrections are collectively referred to as the "Correction").

On June 16, 2021, the JPO approved the Correction and rendered a decision to the effect that the patent for the inventions described in Claims 1 and 2 of Patent No. 4466883 shall be invalidated (hereinafter referred to as the "JPO Decision"). The certified copy of the JPO Decision was served upon the Plaintiff on June 24, 2021.

(3) On July 21, 2021, the Plaintiff filed this lawsuit to seek rescission of the JPO Decision.

2. Statements of the claims

The statements of Claims 1 and 2 in the claims after the Correction are as shown below (hereinafter the invention related to Claim 1 after the Correction is referred to as "Invention 1"; the invention related to Claim 2 after the Correction is referred to as "Invention 2"; and Invention 1 and Invention 2 are collectively referred to as the "Invention").

[Claim 1]

A printed retroreflective sheet, which is a retroreflective sheet consisting of at least a reflective element layer, which consists of many reflective elements and a holder layer, and a surface protective layer, which is installed on the reflective element layer, and is characterized by the following; wherein polycarbonate resin is used for the reflective element layer; wherein (meth)acrylic resin is used for the surface protective layer; wherein the printing layer is installed between the holder layer and the surface protective layer in a manner that it makes contact with the holder layer and the surface protective layer; wherein the printing area of the printing layer forms an independent area and is arranged in a repeating pattern, and does not form a continuous layer, with the area of the independent printing area being 0.15 mm^2 to 30 mm^2; and wherein the printing layer contains titanium oxide as a white inorganic pigment.

[Claim 2]

A printed retroreflective sheet, which is a retroreflective sheet consisting of at least a reflective element layer, which consists of many reflective elements and a holder layer, and a surface protective layer, which is installed on the reflective element layer, wherein the reflective elements are triangular pyramidal cube-corner retroreflective elements, and is characterized by the following; wherein polycarbonate resin is used for the reflective element layer; wherein (meth)acrylic resin is used for the surface protective layer; wherein the printing layer is installed between the holder layer and the surface protective layer in a manner that it makes contact with the holder layer and the surface protective layer; wherein the printing area of the printing layer forms an independent area and is arranged in a repeating pattern, and does not form a continuous layer, with the area of the independent printing area being 0.15 mm^2 to 30 mm^2; wherein the

printing layer thickness is 0.5 μm to 10 μm; and the printing layer contains white titanium oxide.

3. Summary of the JPO Decision

(1) an invention stated in the description of Publication of U.K. Patent Application No. 2171335 (Exhibit Ko 1; hereinafter referred to as "Exhibit Ko 1 Document") which was found by the JPO Decision (hereinafter referred to as "Exhibit Ko 1 Invention), and common features and differences between Inventions 1 and 2 and Exhibit Ko 1 Invention (underlines hereinafter, including Attachment, were provided by the JPO Decision unless particularly noted)

A. Exhibit Ko 1 Invention

"A retroreflective material, which has the plastic backing 10; wherein the first layer 12 of retroreflective material is coated on a single side of the backing 10; wherein the second layer 14 of retroreflective material is coated on the first layer 12; wherein multiple pieces of glass microspheres 16 are installed on the second layer 14; wherein the second layer 14 is formed by a liquid; wherein glass microspheres 16 are partially embedded in the second layer 14 while it is still liquid; wherein when the second layer 14 dries, glass microspheres 16 are firmly secured to the second layer 14; wherein the cover layer 18 is provided on the second layer 14; wherein the cover layer 18 is not attached to the remaining part of the assembly except parts adjacent to the edge of a piece of material; wherein part of the cover layer 18 is colored white; wherein the white color is a retroreflective material printed on a single side or both sides of the cover layer 18; and wherein the white colored part is a uniform pattern of multiple dots."

B. Common features and differences between Invention 1 and Exhibit Ko 1 Invention

(A) Common features

"A printed retroreflective sheet, which is a retroreflective sheet consisting of at least a reflective element layer and a surface protective layer, which is installed on the reflective element layer; wherein the printing layer is installed in a manner that it makes contact with the surface protective layer; and wherein the printing area of the printing layer forms an independent area and is arranged in a repeating pattern, and does not form a continuous layer."

(B) Differences

(Difference 1-1)

In Invention 1, the "retroreflective sheet" is "consisting of at least a reflective element layer, which consists of <u>many reflective elements and a holder layer</u>, and a surface protective layer, which is installed on the reflective element layer" and "the printing layer is installed <u>between the holder layer and the surface protective layer</u> in a

manner that it makes contact with the holder layer and the surface protective layer." However, Exhibit Ko 1 Invention does not have the aforementioned underlined positional relationship and combination of components.

(Difference 1-2)

In Invention 1, "polycarbonate resin is used" for the "reflective element layer." However, in Exhibit Ko 1 Invention, the materials are not specified.

(Difference 1-3)

In Invention 1, "(meth)acrylic resin is used" for the "surface protective layer." However, in Exhibit Ko 1 Invention, the materials are not specified.

(Difference 1-4)

In Invention 1, the "retroreflective sheet" is specified as having "the area of the independent printing area being 0.15 mm^2 to 30 mm^2." However, in Exhibit Ko 1 Invention, the area of the "dots" is not specified.

(Difference 1-5)

In Invention 1, the material of the "printing layer" is specified as containing "titanium oxide as a white inorganic pigment." However, in Exhibit Ko 1 Invention, the materials are not specified.

C. Common features and differences between Invention 2 and Exhibit Ko 1 Invention

(A) Common features

Same as B. (A) above.

(B) Differences

In addition to Differences 1-2 through 1-4, the following points are different.

(Difference 1-1')

In Invention 2, the "retroreflective sheet" is "consisting of at least a reflective element layer, which consists of many reflective elements and a holder layer, and a surface protective layer, which is installed on the reflective element layer, wherein the reflective elements are triangular pyramidal cube-corner retroreflective elements" and "the printing layer is installed between the holder layer and the surface protective layer in a manner that it makes contact with the holder layer and the surface protective layer." However, Exhibit Ko 1 Invention does not have the aforementioned underlined positional relationship and combination of components.

(Difference 1-5')

In Invention 2, the material of the "printing layer" is specified as containing "white titanium oxide as a white inorganic pigment" and its thickness being "0.5 μm to 10 μm." However, in Exhibit Ko 1 Invention, the materials and thickness are not specified.

(2) An invention stated in the description of West Germany Patent Application No.

2118822 (Exhibit Ko 2; hereinafter referred to as "Exhibit Ko 2 Document") which was found by the JPO Decision (as stated below, said invention includes "Exhibit Ko 2 Invention A" or "Exhibit Ko 2 Invention B"; they are collectively referred to as "Exhibit Ko 2 Invention"), and common features and differences between Inventions 1 and 2 and Exhibit Ko 2 Invention A or Exhibit Ko 2 Invention B

A. (A) Exhibit Ko 2 Invention A

"A reflector plate, which is used as a number plate of a vehicle;

which has a plastic plate; wherein the visible surface is smooth, for which the back surface has a triangular prism and is covered with a reflective layer on which the reflective coating is provided; wherein on the visible surface of the reflector plate, letters and/or numbers and other codes are engraved, embossed, or attached; wherein the triangular prism forms an upside-down triangular pyramid;

wherein the codes are in a color different from that of the reflective surface on which the codes are not included; and

wherein many white dots in the form of the "Raster" are printed on the visible surface of the reflector plate in order to show the reflective surface, on which the codes are not included, in white and opaque during the daytime; and wherein the "Raster" is created so that reflected light is transmitted at the predetermined percentage."

(b) Exhibit Ko 2 Invention B

"A reflector plate, which is used as a number plate of a vehicle;

which has a plastic plate; wherein the visible surface is smooth, for which the back surface has a triangular prism; wherein the triangular prism forms an upside-down triangular pyramid;

wherein on the overall visible surface of the reflector plate, a coloring layer, which is a printed transparent foil, is combined with the plastic materials of the plastic plate during or after the casting or injection molding process;

wherein the reflector plate is embossed and then the front part of the embossed codes on the coloring layer is polished by a rotary disc; and

thus, the coloring layer of the convex code is eliminated and, at the same time, the coloring layer of the non-convex surface is maintained."

B. Common features and differences between Invention 1 and Exhibit Ko 2 Invention A

(A) Common features

"A printed retroreflective sheet, which is a retroreflective sheet consisting of at least many reflective elements and a holder layer; wherein a printing layer is installed."

(B) Differences

(Difference 2A-1)

In Invention 1, the "retroreflective sheet" is "consisting of at least a reflective element layer, which consists of many reflective elements and a holder layer, and a surface protective layer, which is installed on the reflective element layer" and "wherein (meth)acrylic resin is used for the surface protective layer; wherein the printing layer is installed between the holder layer and the surface protective layer in a manner that it makes contact with the holder layer and the surface protective layer." However, Exhibit Ko 2 Invention A does not have the "surface protective layer" "wherein (meth)acrylic resin is used" and the aforementioned underlined positional relationship.

(Difference 2A-2)

In Invention 1, "polycarbonate resin is used" for the "reflective element layer." However, in Exhibit Ko 2 Invention A, the materials are not specified.

(Difference 2A-3)

In Invention 1, regarding the "printing layer," "the printing area of the printing layer forms an independent area and is arranged in a repeating pattern, and does not form a continuous layer, with the area of the independent printing area being 0.15 mm^2 to 30 mm^2." However, in Exhibit Ko 2 Invention A, "many white dots in the form of the 'Raster' are printed on the visible surface of the reflector plate in order to show the reflective surface, on which the codes are not included, in white and opaque during the daytime, and the 'Raster' is created so that reflected light is transmitted at the predetermined percentage."

(Difference 2A-4)

In Invention 1, the material of the "printing layer" has a structure that "contains titanium oxide as a white inorganic pigment." However, in Exhibit Ko 2 Invention A, the materials are not specified.

C. Differences between Invention 2 and Exhibit Ko 2 Invention A

In addition to Differences 2A-1 through 2A-3, the following points are different.

(Difference 2A-4')

In Invention 2, the material of the "printing layer" is specified as containing "white titanium oxide as a white inorganic pigment" and its thickness is specified to be "0.5 μm to 10 μm." However, in Exhibit Ko 2 Invention A, the materials and thickness are not specified.

D. Differences between Invention 1 and Exhibit Ko 2 Invention B

(Difference 2B-1)

In Invention 1, "(meth)acrylic resin is used" for the "surface protective layer." However, in Exhibit Ko 2 Invention B, the materials are not specified.

In addition, in Invention 1, the "retroreflective sheet" has a structure wherein "the printing layer is installed between the holder layer and the surface protective layer in a manner that it makes contact with the holder layer and the surface protective layer." However, in Exhibit Ko 2 Invention B, the underlined positional relationship is not obvious.

(Difference 2B-2)

In Invention 1, "polycarbonate resin is used" for the "reflective element layer." However, in Exhibit Ko 2 Invention B, the materials are not specified.

(Difference 2B-3)

In Invention 1, "the printing area of the printing layer" "forms an independent area and is arranged in a repeating pattern, and does not form a continuous layer, with the area of the independent printing area being 0.15 mm^2 to 30 mm^2." However, in Exhibit Ko 2 Invention B, it is not obvious whether it has the aforementioned structure.

(Difference 2B-4)

In Invention 1, the material of the "printing layer" has a structure of containing "titanium oxide as a white inorganic pigment." However, in Exhibit Ko 2 Invention B, the materials are not specified.

E. Differences between Invention 2 and Exhibit Ko 2 Invention B

In addition to Differences 2B-1 through 2B-3, the following points are different.

(Difference 2B-4')

In Invention 2, the material of the "printing layer" is specified as containing "white titanium oxide as a white inorganic pigment" and its thickness is specified to be "0.5 μm to 10 μm." However, in Exhibit Ko 2 Invention B, the materials and thickness are not specified.

(3) Grounds for Invalidation 1 (lack of an inventive step)

A. Invention 1

(A) Differences 1-1 and 1-2

Exhibit Ko 1 Document is a publication issued in 1986 and Exhibit Ko 1 Invention is based on the technical level of a person skilled in the art at that time. However, a person skilled in the art before the filing of the Application would understand a retroreflective sheet that uses the retroreflective principle of a cube-corner retroreflective element, such as a triangular pyramidal reflective element, etc., as "retroreflective material" which has superior retroreflective properties. In addition, the characteristic part of Exhibit Ko 1 Invention is seen where "part of the cover layer 18" "is colored white," and "the white colored part" "is a uniform pattern of multiple dots." Therefore, Exhibit Ko 1 Invention intends to satisfy both the retroreflective properties

at night and the white colored nature under sunlight for traffic hazard signs and road signs.

Then, it is considered that a person skilled in the art would also apply the structure stated in Unexamined Patent Application Publication No. 1999-305018 (Exhibit Ko 3; hereinafter referred to as "Exhibit Ko 3 Document") to the "retroreflection" in Exhibit Ko 1 Invention. In other words, [0137] and FIG.13 of Exhibit Ko 3 Document have the following statements: "a triangular pyramidal cube-corner retroreflective sheet which comprises, in the order from the incident direction of light (10), the surface protective layer (4), the printing layer (5) for communicating information to the observer or coloring the sheet, the holding layer (2) for holding reflective elements, reflective element layer (1) where triangular pyramidal retroreflective elements (R_1, R_2) are arranged in the closest packing state, the air layer (3) for guaranteeing retroreflection at the interface of the reflective element, the bonding material layer (6) for achieving the sealing structure to prevent water from penetrating into the back side of the reflective element layer, the holder layer (7) that supports the bonding material layer (6), and the adhesive agent layer (8) and the separating agent layer (9) that are used to attach the retroreflective sheet to another structure" (hereinafter the statements are referred to as "Art Disclosed in Exhibit Ko 3"). Therefore, a person skilled in the art who compares both of them from a functional perspective would consider to replace the structure for retroreflection in Exhibit Ko 1 Invention consisting of the first layer 12, second layer 14, and a space, with the structure in the Art Disclosed in Exhibit Ko 3, which is also a structure for retroreflection, consisting of the holder layer (2), reflective element layer (1), air layer (3), and bonding material layer (6) by reversing the order of the layers.

Therefore, in Exhibit Ko 1 Invention, applying the structures related to Difference 1-1 and Difference 1-2 is within the regular creativity and ingenuity of a person skilled in the art.

(B) Difference 1-3

Exhibit Ko 1 Document has no specific statements on the materials of "the cover layer 18." Since it is common general technical knowledge that (meth)acrylic resin has excellent weatherability, transparency, shine, etc., a person skilled in the art would consider to apply the structure using (meth)acrylic resin, which has excellent transparency and weatherability, to the material of "the cover layer 18" in Exhibit Ko 1 Invention.

(C) Difference 1-4

When printing "multiple dots" in Exhibit Ko 1 Invention, it can be said that a person

skilled in the art can conceive of creating a space to the extent the light retroreflection is not prevented since it is necessary to satisfy both the retroreflective properties at night and the white colored nature under sunlight; and also can conceive of the structure of having "the area of the independent printing area being 0.15 mm^2 to 30 mm^2" in Invention 1 related to Difference 1-4 since it is required to design and print "a uniform pattern of multiple dots" in a size where the "retroreflective material" looks white as a whole.

(D) Difference 1-5

In consideration of the fact that white titanium oxide is widely used as a color material for coloring in white, applying the structure related to Difference 1-5 to Exhibit Ko 1 Invention is only a natural option for a person skilled in the art.

(E) Effects of invention

The Description has no statements related to the effects of the invention; however, it has the following statement: "In light of the defects in the prior art as above, the present invention provides a retroreflective sheet for which the hue is improved by employing a very simple and inexpensive method" ([0014]). Since Exhibit Ko 1 Invention has a structure wherein "part of the cover layer 18 is colored white; wherein the white colored part is printed on a single side or both sides of the cover layer 18," it is regarded to be a retroreflective sheet for which the hue is improved by employing a very simple and inexpensive method. In addition, "the cover layer 18" in Exhibit Ko 1 Invention has a structure wherein "the cover layer 18 is not attached to the remaining part of the assembly except adjacent to the edge of a piece of material." Therefore, Exhibit Ko 1 Invention is considered to show the effects of weatherability and water resistance and effects at the same level as the effects that are understood by the working example of Invention 1. These effects continue to be shown even if the Art Disclosed in Exhibit Ko 3 is applied.

It cannot be said that the effects of Invention 1 could not be predicted by a person skilled in the art as those shown by the structure of Invention 1 at the time when the Application was filed and it cannot be said that the effects are significant and beyond the effects in the scope that a person skilled in the art could have predicted.

B. Invention 2

(A) Differences 1-1' and 1-2

Same as A. (A) above.

(B) Differences 1-3 and 1-4

Same as of A. (B) and (C) above.

(C) Difference 1-5'

In consideration of the facts that white titanium oxide is widely used as a color material for coloring in white and the thickness of a regular printing layer for coloring is included in the range of "0.5 μm to 10 μm," applying the structure of Difference 1-5' to Exhibit Ko 1 Invention is only a natural option for a person skilled in the art.

(D) Effects of invention

Same as A. (E) above.

C. Summary

Inventions 1 and 2 could have been easily conceived of by a person skilled in the art based on Exhibit Ko 1 Invention that is stated in Exhibit Ko 1 Document, which is a publication distributed in Japan and overseas before the Application was filed, and the Art Disclosed in Exhibit Ko 3, as well as on well-known art, and therefore, they cannot be patented pursuant to the provisions of Article 29, paragraph (2) of the Patent Act.

(4) Grounds for Invalidation 2 (lack of an inventive step)

A. Invention 1 (in cases where Exhibit Ko 2 Invention A is regarded as a prior art)

(A) Difference 2A-1

Exhibit Ko 2 Invention A is a reflector plate that is used as number plates for vehicles. It is obvious that "many white dots" "printed" on the "visible surface" should be protected. Therefore, it is appropriate to protect the surface with a protective layer using (meth)acrylic resin that has excellent weatherability, transparency, and shine. A person skilled in the art can apply the structure wherein the protective layer is provided on the "visible surface" on which "many white dots are printed" in order to protect the surface by providing a transparent film using (meth)acrylic resin or a hard coat layer using (meth)acrylic resin, and therefore, a person skilled in the art can conceive of the structure of Difference 2A-1.

(B) Difference 2A-2

The "plastic plate" in Exhibit Ko 2 Invention A has a "triangular prism" that "forms an upside-down triangular pyramid." Therefore, it can be said that a person skilled in the art focuses on well-known polycarbonate resin that is a resin with excellent morphological stability, etc.

(C) Difference 2A-3

The "many white dots" in Exhibit Ko 2 Invention A are "to show the reflective surface, on which the codes are not included, in white and opaque during the daytime" and make it sure "so that reflected light is transmitted at the predetermined percentage." Since they are expressed as "many white dots," it can be understood that they are printed in a meshed form. In addition, the meshed form consisting of many white dots is

included in the pattern options of a person skilled in the art who prints "many white dots" "to show the reflective surface, on which the codes are not included, in white and opaque during the daytime" and make it sure " so that reflected light is transmitted at the predetermined percentage." Then, the structure wherein "the printing area of the printing layer forms an independent area and is arranged in a repeating pattern, and does not form a continuous layer" in Difference 2A-3 is not a difference; or if it is a difference, it is only one of the options that a person skilled in the art can select optionally.

In addition, the determination on the size of each "dot" (mesh) of "many white dots" is the same as Difference 1-4 ((3), A. (C) above).

(D) Difference 2A-4

It is the same as Difference 1-5 ((3) A. (D) above).

(E) Effects of invention

In Exhibit Ko 2 Invention A, many white dots are provided by printing as a means to show the reflective surface, on which codes are not included, in white and opaque during the daytime. Therefore, it can be said that Exhibit Ko 2 Invention A "provides a retroreflective sheet for which the hue is improved by employing a very simple and inexpensive method" ([0014] of the Description) and the effects of excellent weatherability and water resistance ([0015] of the Description) are only the effects that are predicted by a person skilled in the art who can install the protective layer.

Therefore, it cannot be said that the effects of Invention 1 could not be predicted by a person skilled in the art as those shown by the structure of Invention 1 at the time when the Application was filed and it cannot be said that the effects are significant and beyond the effects in the scope that a person skilled in the art could have predicted based on the structure of Invention 1.

B. Invention 2 (in cases where Exhibit Ko 2 Invention A is regarded as a prior art)

(A) Differences 2A-1 through 2A-3

They are as stated in A. (A) through (C) above.

(B) Difference 2A-4'

In consideration of the facts that white titanium oxide is widely used as a color material for coloring in white and the thickness of a regular printing layer for coloring is included in the range of "0.5 μm to 10 μm," applying the structure of Difference 2A-4' to Exhibit Ko 2 Invention A is only a natural option for a person skilled in the art.

(C) Effects of invention

It is as stated in A. (E) above.

C. Invention 1 (in cases where Exhibit Ko 2 Invention B is regarded as a prior art)

(A) Differences 2B-1

The "reflector plate" in Exhibit Ko 2 Invention B is "used as number plates for vehicles" and it should be resistant to outdoor use and transparency should be kept. Therefore, as the material for the "transparent foil," it is appropriate to use (meth)acrylic resin, which has excellent weatherability, transparency, shine, etc. In addition, in Exhibit Ko 2 Invention B, it is obvious that the printed side of the "printed transparent foil" is combined with a "plastic plate" in order to protect the printing from contamination or damage, etc. and it is a structure that a person skilled in the art would naturally apply when considering the protection of the printed surface.

(B) Difference 2B-2

It is the same as Difference 2A-2.

(C) Difference 2B-3

If a person skilled in the art gives a shape to the "printed transparent foil," it is considered that he/she refers to the many white dots that are stated in Exhibit Ko 2 Document. The determinations on the pattern of "many white dots" and the size of each "dot" (mesh) are the same as those on Differences 2A-3 and 1-4.

(D) Difference 2B-4

It is the same as the determination on Difference 1-5.

(E) Effects of invention

They are as stated in A. (E) above.

D. Invention 2 (in cases where Exhibit Ko 2 Invention B is regarded as a prior art)

(A) Differences 2B-1 through 2B-3

They are as stated in C. (A) through (C) above.

(B) Difference 2B-4'

It is the same as Difference 2A-4

(C) Effects of invention

They are as stated in A. (E) above.

E. Summary

Inventions 1 and 2 could have been easily conceived of by a person skilled in the art based on Exhibit Ko 2 Invention A and Exhibit Ko 2 Invention B that are stated in Exhibit Ko 2 Document, which is a publication distributed in Japan and overseas before the Application was filed, as well as on well-known art. Therefore, Inventions 1 and 2 cannot be patented pursuant to Article 29, paragraph (2) of the Patent Act.

(5) Grounds for Invalidation 3 (violation of support requirements)

The problem of the Invention is to obtain "a retroreflective sheet with excellent weatherability and water resistance and for which the hue is improved" ([0004], [0008],

[0012], [0014], and [0015]).

However, the "Claims" of the Invention only stated, concerning the layered structure of the "holder layer," "surface protective layer" and "printing layer," that "the printing layer is installed between the holder layer and the surface protective layer in a manner that it makes contact with the holder layer and the surface protective layer" and there is no statement specifying whether the "holder layer" makes contact with the "surface protective layer." Therefore, the Invention lacks the structure wherein the "holder layer" and "surface protective layer" are bonded together at a width where adhesion is ensured and the Invention includes a form that cannot be evaluated as having "no abnormality" by the weatherability test ([0054]) stated in the Description.

Therefore, since the Invention cannot be deemed to be stated in the detailed explanation of the invention, the statements of the claims of the Patent do not satisfy the requirements prescribed in Article 36, paragraph (6), item (i) of the Patent Act.

4. Grounds for rescission

(1) Error in the determination on whether Inventions 1 and 2, which use Exhibit Ko 1 Invention as the primary prior art, lack an inventive step

A. Error in the findings of the common features and differences between Invention 1 and Exhibit Ko 1 Invention (Grounds for Rescission 1-1-1)

B. Error in the determination on whether Invention 1 could have been easily conceived of by a person skilled in the art based on the differences found by the JPO Decision (Grounds for Rescission 1-1-2)

C. Error in the findings of the common features and differences between Invention 2 and Exhibit Ko 1 Invention (Grounds for Rescission 1-2-1)

D. Error in the determination on whether Invention 2 could have been easily conceived of by a person skilled in the art based on the differences found by the JPO Decision (Grounds for Rescission 1-2-2)

(2) Error in the determination on whether Inventions 1 and 2, which use Exhibit Ko 2 Invention A or Exhibit Ko 2 Invention B as the primary prior art, lack an inventive step

A. Error in the findings of the common features and differences between Invention 1 and Exhibit Ko 2 Invention A (Grounds for Rescission 2A-1-1)

B. Error in the determination on whether Invention 1 could have been easily conceived of by a person skilled in the art based on the difference found by the JPO Decision (Grounds for Rescission 2A-1-2)

C. Error in the findings of the common features and differences between Invention 2 and Exhibit Ko 2 Invention A (Grounds for Rescission 2A-2-1)

D. Error in the determination on whether Invention 2 could have been easily conceived

of by a person skilled in the art based on the difference found by the JPO Decision (Grounds for Rescission 2A-2-2)
E. Error in the findings of the common features and differences between Invention 1 and Exhibit Ko 2 Invention B (Grounds for Rescission 2B-1-1)
F. Error in the determination on whether Invention 1 could have been easily conceived of by a person skilled in the art based on the differences found by the JPO Decision (Grounds for Rescission 2B-1-2)
G. Error in the findings of the common features and differences between Invention 2 and Exhibit Ko 2 Invention B (Grounds for Rescission 2B-2-1)
H. Error in the determination on whether Invention 2 could have been easily conceived of by a person skilled in the art based on the differences found by the JPO Decision (Grounds for Rescission 2B-2-2)
(3) Error in the determination on the violation of the support requirements (Grounds for Rescission 3)

(omitted)

No. 4 Judgment of this court
1. Statement in the Description (Exhibit Ko 73)
The Description has the statements as stated in Attachment 1 and, according to said statements, it is found that the following are disclosed concerning the Invention.
(1) A retroreflective sheet that reflects incident light towards the light source is widely used for signs, such as road signs, construction signs, etc., and number plates for vehicles and automobiles, etc. In particular, a cube-corner retroreflective sheet, for which the retroreflection principle of a cube-corner retroreflective element, such as a triangular pyramidal reflective element, etc., is used, and a triangular pyramidal cube-corner retroreflective sheet, wherein a vapor deposition layer is provided on the reflective element surface of reflective elements, have a dramatically excellent light retroreflective efficiency compared to conventional retroreflective sheets using micro glass spheres. However, a vapor deposition-type triangular pyramidal cube-corner retroreflective sheet has the defect that it is affected by the metal color and becomes dark due to the nature of the retroreflection element. Therefore, in order to improve the hue of the triangular pyramidal cube-corner retroreflective sheet and the metallic vapor-deposition triangular pyramidal cube-corner retroreflective sheet, the attempt has also been made to provide a consecutive printing layer on part of the retroreflective sheet ([0002] through [0004] and [0008]).

(2) However, the printing layer has slightly less adhesion with both the reflective element and surface protective layer and has defects, such as that the layer itself has less weatherability and it may cause a blister in the weatherability test, or it easily absorbs water. It also has the defect that if a consecutive printing layer is provided on a triangular pyramidal cube-corner retroreflective sheet or vapor deposition-type triangular pyramidal cube-corner retroreflective sheet, adhesion around the printing layer decreases, and therefore, it is inferior in weatherability and water resistance ([0012]).

The Invention found that a retroreflective sheet with improved hue which solved the defects in existing art, that is, poor weatherability and water resistance if a printing layer is provided on a triangular pyramidal cube-corner retroreflective sheet or a vapor deposition-type triangular pyramidal cube-corner retroreflective sheet in order to improve the hue of these sheets, may be obtained by employing a very simple and inexpensive method, and completed it. ([0014] and [0015]).

(3) The Invention aims to provide a printed retroreflective sheet, which is a retroreflective sheet consisting of at least a reflective element layer, which consists of many reflective elements and a holder layer, and a surface protective layer, which is installed on the reflective element layer and is characterized by; [i] wherein polycarbonate resin is used for the reflective element layer and (meth)acrylic resin is used for the surface protective layer; [ii] wherein the printing layer is installed between the holder layer and the surface protective layer in a manner that it makes contact with the holder layer and the surface protective layer; [iii] wherein the printing area of the printing layer forms an independent area and is arranged in a repeating pattern, and does not form a continuous layer, with the area of the independent printing area being 0.15 mm^2 to 30 mm^2; and [iv] wherein the printing layer contains titanium oxide as a white inorganic pigment ([0016]).

2. Grounds for Rescission 1-1-1 (Error in the findings of the common features and differences between Invention 1 and Exhibit Ko 1 Invention)

(1) Statements in Exhibit Ko 1 Document

A. Exhibit Ko 1 Document is found to have the statements as shown in Attachment 2 (the translation of "Claims" 2 through 4 is based on Exhibit Otsu 1 and translation of other parts is based on the JPO Decision; the same applies hereinafter), and according to said statements, it discloses the following concerning Exhibit Ko 1 Invention.

(A) "This invention" is an invention related to retroreflective materials for traffic hazard indicators, such as cones and bollards, and for road signs and the like (lines 3 through 8, page 1).

(B) It is general practice to impart retro-reflective properties to traffic hazard indicators by placing an appropriate shaped retro-reflective sleeve over road cones or bollards. To meet present requirements the sleeve must reflect incident light at night for example from the headlights of vehicles, and in daylight, the sleeve must appear white. To achieve this, a layer of adhesive containing a white pigment is applied over the reflective coating and glass microspheres are partially embedded in the adhesive. The white pigment in the adhesive in the assembly reduces the retro-reflectivity. If the amount of white pigment in the adhesive is reduced, retro-reflectivity can be improved but the material will no longer have a sufficiently white appearance in daylight (lines 9 through 31, page 1).

(C) "This invention" provided a retro-reflective material comprising a backing, a retro-reflective coating on said backing, glass microspheres attached to said retro-reflective coating (lines 34 through 47, page 1); The white colored material of this invention can be printed on a single side or both sides of a transparent or translucent cover sheet which extends over the retro-reflective coating (lines 48 through 53, page 1); The retro-reflective coating is formed in two layers, and the second layer is applied after the first layer has dried and the microspheres are attached to the second layer (lines 60 through 66, page 1); The retro-reflective material comprises the backing 10 … of plastics. Layer 12 of retro-reflective material is applied to one side of the backing. … The second layer 14 of retro-reflective material is applied over the first layer 12 (lines 74 through 83, page 1); Multiple glass microspheres 16 … are attached to the second layer 14, the second layer is formed by a liquid, and while the layer is still liquid, the glass microspheres are partially embedded therein. When the second layer dries, the glass microspheres are firmly secured to the second layer (lines 88 through 94, page 1); and a transparent or translucent cover layer 18 is provided over the second layer 16, and preferably, the cover layer 18 is not attached or secured to the remaining part of the assembly except adjacent to the edge of the piece of material. Part of the cover layer is colored white, and the white coloration can be provided on a single side or both sides of the cover layer. … The white colored part can be in a … uniform pattern, for example in the form of dots (lines 99 through 114, page 1).

B. According to the statements above, Exhibit Ko 1 Invention is found to be as found by the JPO Decision.

(2) Error in the findings of Exhibit Ko 1 Invention alleged by the Plaintiff

A. The Plaintiff alleged, as stated in No. 3, 1. (1) A. (B) a. above: [i] even if it is stated that the form of the "multiple dots," "multiple lines" or "other regular" or "irregular shapes" that are stated in Exhibit Ko 1 Document can be in a "random" or "uniform"

pattern, many combinations are considered for them, and therefore, it cannot be construed that retroreflective coating 14 and the white colored part of the backing material 10 have the specific structure of a "uniform" pattern of "multiple dots"; [ii] if the fact that the "white colored part is a uniform pattern of multiple dots" is disclosed in Exhibit Ko 1 Document, it only discloses the aforementioned structure concerning "the first layer 12," "the second layer 14," and "the backing material 10" that are "retroreflective coating," and the aforementioned structure is not disclosed in cases where a white pigment is printed on a single side or both sides of "the cover layer 18"; and [iii] in Exhibit Ko 1 Invention, if the structure wherein the "white colored part is a uniform pattern of multiple dots" is applied in cases where a white pigment is printed on a single side or both sides of the cover layer 18, it decreases retroreflective properties and the problem of Exhibit Ko 1 Invention, "the white color must not obscure or attenuate more than a limited amount (of the retro-reflectivity of the retro-reflective coating)" cannot be solved; and therefore, even if Exhibit Ko 1 Document has a statement that part of the cover layer 18 is colored white, a person skilled in the art would not understand it as a form wherein the "white colored part is a uniform pattern of multiple dots."

However, as stated in (1) above, Exhibit Ko 1 Document has the following statements: "Part of the cover layer is colored white. The white coloration can be provided on a single side or both sides of the cover layer. ... The white colored part can be in a random or uniform pattern, for example in the form of dots, lines or other regular or irregular shapes." (Lines 99 through 114, page 1) It is disclosed that the white coloration pattern can be selected as necessary to the extent that "the white color must not obscure or attenuate more than a limited amount of the retro-reflectivity of the retro-reflective coating" (lines 115 through 118, page 1). Therefore, it can be said that Exhibit Ko 1 Document discloses that the "white colored part," which is one of the aforementioned patterns, "is a uniform pattern of multiple dots."

In addition, Exhibit Ko 1 Document has the following statements: "Part of the cover layer is colored white. The white coloration can be provided on a single side or both sides of the cover layer. Alternatively, the white color can be applied directly onto the retro-reflective coating 14 before the microspheres are attached thereto or the retro-reflective coating can be discontinuous to expose the backing. The backing can itself be colored white or white color can be applied to the exposed parts of the backing. The white colored part can be in a … uniform pattern, for example in the form of dots, ..." (lines 99 through 114, page 1). The aforementioned underlined part is understood to show a working example of coloring on the retroreflective coating or the backing

materials in white "alternatively" to the structure wherein "the white colored part is a cover layer," in other words, as another option of the white colored part. Therefore, it should be said that, based on the structure wherein "the white colored part is a cover layer" and the structure of other options, the pattern of the "white colored part" is disclosed in the double-underlined part.

In addition, Exhibit Ko 1 Document has the following statements: "white color can be printed on a single side or both sides of a transparent or translucent cover sheet which extends over the retro-reflective coating." (lines 48 through 53, page 1); "Part of the cover layer is colored white. The white coloration can be provided on a single side or both sides of the cover layer." (lines 99 through 114, page 1); and "In order to ensure that the assembly has the requisite reflectivity, the white color must not obscure or attenuate more than a limited amount of the retro-reflectivity of the retro-reflective coating. However, sufficient white color must be present such that the material appears white in daylight. Generally satisfactory assemblies are obtained with from 10% to 20%, preferably from 12% to17%, of the area of the material colored white. (lines 115 through 123, page 1) In addition to the above statements, in the claims, there are the following statements: "A retro-reflective material comprising a backing, a retro-reflective coating on said backing, glass microspheres attached to said retro-reflective coating, wherein said coating is or appears incomplete, and white color is provided in the part or parts where the coating is or appears to be absent." (Claim 1); "A retro-reflective material as claimed in Claim1, wherein the white color is provided over the retro-reflective coating." (Claim 2); "A retro-reflective material as claimed in Claim 1 or Claim 2, wherein the white color is applied directly onto the retro-reflective coating." (Claim 3); "A retro-reflective material as claimed in Claim 1 or Claim 2, wherein the white color is provided on a cover sheet which extends over the retro-reflective coating." (Claim 4)

Then, it can be construed that the problem can be solved if Exhibit Ko 1 Invention has a structure wherein the white color of a covered layer, which is colored white so that it looks white in daylight, is adjusted by the percentage of the area of materials and "the white color does not obscure or attenuate more than a limited amount of the retro-reflectivity of the retro-reflective coating" at night. Therefore, it cannot be regarded that the structure with a uniform pattern of multiple dots on a single side or both sides of the cover layer 18 is against the technical idea of Exhibit Ko 1 Invention.

Consequently, none of the aforementioned allegations of the Plaintiff can be accepted.

B. As stated in No. 3, 1. (1) A. (B) b. above, based on the assumption that "Part of the

cover layer is ..." in Exhibit Ko 1 Document (lines 103 through 114, page 1) indicates "a single part of a cover layer," the Plaintiff alleged that the "single part of a cover layer" refers to the "part adjacent to the edges" of the piece of material; and if the part adjacent to the edges of the piece of material is colored white, retroreflective properties will not decrease and a white appearance can be obtained; and therefore, "part of the cover layer 18" should be found to be a "single part of the cover layer."

However, as stated in (A) above, Exhibit Ko 1 Document discloses that the white colored part that is printed on a single side or both sides of "the cover layer 18" is a uniform pattern of multiple dots. It is not necessary to construe that "the part adjacent to the edges of the piece of material" of the cover layer alone is colored white. In the expression "Part of the cover" in Exhibit Ko 1 Document as pointed out by the Plaintiff, the term indicating a specific part, such as "the part," etc., is not used. Therefore, it does not refer to the phrase, "Preferably the cover layer 18 is ... the edges of the piece of material," which is immediately before said expression. It is reasonable to construe as pointed out by the Defendant that it handles multiple items collectively as a singular form.

Consequently, the aforementioned allegations of the Plaintiff cannot be accepted. In addition, the Plaintiff alleged other matters concerning errors in the findings of the JPO Decision, including whether the translation related to terms is appropriate, etc. However, none of them are relevant or have an impact on the aforementioned conclusion.

(3) Common features and differences between the Invention and Exhibit Ko 1 Invention

A. As stated in (2) above, there is no error with Exhibit Ko 1 Invention that was found by the JPO Decision. Comparing Exhibit Ko 1 Invention with Invention 1 on the premise of the above, Invention 1 is different from Exhibit Ko 1 Invention in relation to Differences 1-1 through 1-5 as found by the JPO Decision.

B. (A) On the other hand, the Plaintiff alleged, as stated in No. 3, 1. (1) B.(A) a. above, that since there are not "many reflective elements" in Exhibit Ko 1 Invention, the "light retroreflective element layer" in Exhibit Ko 1 Invention does not fall under the reflective element layer in Invention 1.

The "light retroreflective element layer" that is found by the JPO Decision as pointed out by the Plaintiff is a collective name of "the first layer 12," "the second layer 14," "the glass microspheres 16," and the space. Difference 1-1 is that "the 'retroreflective sheet' in Invention 1 consists of 'at least a reflective element layer, which consists of many reflective elements and a holder layer,' and 'a surface protective layer, which is installed on the reflective element layer' and 'wherein the printing layer is installed between the holder layer and the surface protective layer in a manner that it

makes contact with the holder layer and the surface protective layer'; on the other hand, Exhibit Ko 1 Invention does not have the aforementioned underlined positional relationship and combination of components." Therefore, even if Exhibit Ko 1 Invention has nothing falling under "many reflective elements," it cannot be regarded that the difference is overlooked.

(B) The Plaintiff alleged, as stated in No. 3, 1. (1) B. (A) b. above, that a retroreflective sheet is supposed to be cut when used; as determined by the JPO Decision, if the retroreflective sheet in Exhibit Ko 1 Invention is not supposed to be cut or destroyed when used, the "retroreflective material" in Exhibit Ko 1 Invention does not fall under the retroreflective sheet in Invention 1. However, the Description has no statements that limit the retroreflective sheet related to the Invention to being cut and destroyed. It is not necessary to indicate the explanation by the JPO decision related to Exhibit Ko 1 Invention and purposely find it as difference between Invention 1 and Exhibit Ko 1 Invention.

(C) The Plaintiff alleged, as stated in No. 3, 1. (1) B. (A) c. above, that even if Exhibit Ko 1 Invention has a structure wherein "the white colored part is a uniform pattern of multiple dots," "multiple dots" in Exhibit Ko 1 Invention are not provided with the structure wherein "the printing area … forms an independent area" in Invention 1. However, Exhibit Ko 1 Document has the following statements: "... therefore, white pigmented material is not applied uniformly over the retro-reflective coating but is provided only over multiple parts of the coating. These parts may be discrete ... multiple areas such as multiple spots ... or other shapes and they may be regularly ... distributed over the assembly." (lines 34 through 47, page 1) Based on the term "discrete," it can be regarded that each white colored part of the cover layer forms an individual area. Therefore, when comparing it with Exhibit Ko 1 Invention, the fact concerning multiple dots that "the printing area … forms an independent area" is not a difference from Invention 1, but should be found to be a common feature.

C. Consequently, none of the allegations of the Plaintiff can be accepted.

(4) Summary

Based on the above, there is no error in the findings of Exhibit Ko 1 Invention by the JPO Decision; there is no overlooking of differences in the comparison between Invention 1 and Exhibit Ko 1 Invention; and there is no error in the findings of differences by the JPO Decision.

3. Grounds for Rescission 1-1-2 (Error in the determination on whether Invention 1 could have been easily conceived of by a person skilled in the art based on the differences found by the JPO Decision)

(1) According to the disclosure in 1. above, the Invention is intended to solve the problem with prior art, that is, poor weatherability and water resistance in the case where a printing layer is provided on a triangular pyramidal cube-corner retroreflective sheet or a vapor deposition-type triangular pyramidal cube-corner retroreflective sheet, etc. in order to improve the hue of these sheets. Its technical meaning exists in providing a retroreflective sheet with the following characteristics: [i] polycarbonate resin is used for the reflective element layer and (meth)acrylic resin is used for the surface protective layer; [ii] the printing layer is installed between the holder layer and the surface protective layer in a manner that it makes contact with the holder layer and the surface protective layer; [iii] the printing area of the printing layer forms an independent area that is arranged in a repeating pattern, and does not form a continuous layer, with the area of the independent printing area being 0.15 mm^2 to 30 mm^2; and [iv] the printing layer contains titanium oxide as a white inorganic pigment. In consideration of the difference between the structures of the working examples and the comparative examples disclosed in the Description and the test results ([0079]), [ii] and [iii] above can be regarded as structures that are indispensable for solving the problem.

It then follows that it is inappropriate to examine whether the Invention could have been easily conceived of by focusing separately on Difference 1-1 and Difference 1-4 relating to [ii] and [iii] above, but rather these should be examined as forming a single structure (if it is examined individually, the Conclusion will not be affected; the same applies hereinafter).

(2) The Defendant alleged, as stated in No. 3, 2. (2) A. (A) above, that a person skilled in the art has the motivation to replace the layer structure in Exhibit Ko 1 Invention, which exists between the cover layer 18 and the backing material 10 and fulfills the retroreflective functions, that is, the layer structure consisting of "retroreflective coated first layer 12, retroreflective coated second layer 14 that is applied on first layer 12, glass microspheres 16 that are attached to the second layer, and air layer," with the layer structure, which exists between surface protective layer (4) and holder layer (7) as stated in Exhibit Ko 3 Document, that is, the layer structure consisting of "a triangular pyramidal cube-corner retroreflective material made of polycarbonate resin in which reflective element layer (1) and holder layer (2) are formed integrally, air layer (3), and bonding material layer (6)," after taking into account the incident direction of light, with the aim of solving the problem of Exhibit Ko 1 Invention, "to increase the retroreflective efficiency" and "to acquire a fully white appearance in daylight by increasing retroreflection." Therefore, the statements in Exhibit Ko 3 Document are examined first.

(3) A. Exhibit Ko 3 Document has the statements as shown in Attachment 4. According to the statements, it is found that the following are disclosed.

(A) The "present invention" relates to a triangular pyramidal cube-corner retroreflective sheet with a new structure and relates to a triangular pyramidal cube-corner retroreflective sheet comprised of triangular pyramidal cube-corner retroreflective elements that are useful for signs, such as road signs, construction signs, etc., and for number plates for vehicles and automobiles, and other reflector plates, etc. ([0001] and [0002]).

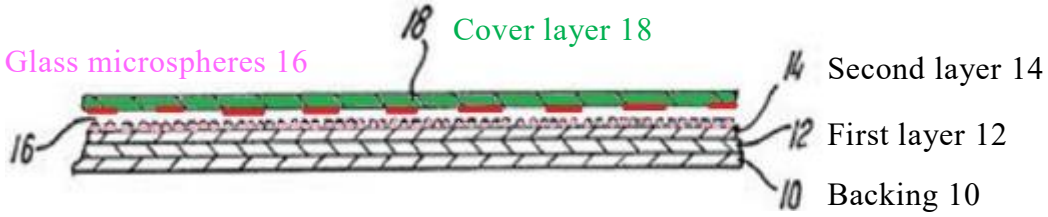
(B) A retroreflective sheet that reflects incident light towards the light source has been well known. In particular, a retroreflective sheet that uses the retroreflection principle of cube-corner retroreflective elements, such as triangular pyramidal retroreflective elements, etc., has a dramatically excellent light retroreflective efficiency compared to conventional retroreflective sheets using micro glass spheres. Thanks to the excellent retroreflective performances, the use of retroreflective sheets is expanding year by year. However, there is the problem that conventional publicly-known triangular pyramidal retroreflective elements show good retroreflective efficiency within a range where the angle between the optic axis of elements and the incident light based on the reflection principle is small; however, as the incident angle increases, the retroreflective efficiency rapidly decreases ([0006] and [0007]).

(C) The retroreflective sheet in the "present invention" makes it possible to improve the wide angle of observation angle properties, incident angle properties, rotation angle properties, etc. in addition to high luminance, which is a basic optical property generally required of a triangular pyramidal cube-corner retroreflective sheet, in other words, the level of reflection luminance that is represented by the reflection luminance of the incident light from the front of the sheet ([0160]).

B. According to the statements in [0137] and FIG. 13 in Exhibit Ko 3 Document, it is found to be disclosed that "a triangular pyramidal cube-corner retroreflective sheet which comprises, in the order from the incident direction of light (10), the surface protective layer (4), the printing layer (5) for communicating information to the observer or coloring the sheet, the bonding material layer (6) for achieving the sealing structure to prevent water from penetrating into the back side of the reflective element layer, the air layer (3) surrounded by the reflective element layer (1) and the bonding material layer (6) for guaranteeing retroreflection at the interface of the reflective element, the holder layer (7) that supports the bonding material layer (6), and the adhesive agent layer (8) and the separating agent layer (9) that are used to attach the retroreflective sheet to another structure " ("Art Disclosed in Exhibit Ko 3" found by

the JPO Decision).

(4) A. Based on the above, Grounds for Rescission 1-1-2 are examined below. The structure of Exhibit Ko 1 Invention comprises "the backing 10 made of plastic," "the first layer 12 made of retroreflective material on one side of the plastic backing 10," "the second layer 14 made of retroreflective material" over the first layer 12, glass microspheres 16 that are firmly fixed and partly embedded in the second layer 14, and the cover layer 18. Part of the cover layer 18 is colored white, and the white coloration is printed on a single side or both sides of the cover layer 18. The cover layer 18 is not attached to the assembly except adjacent to the edges of the piece of material, or in other words, there is a space between the cover layer 18 and the glass microspheres 16. The space between the printing layer and the glass microspheres 16 forms a path of light of retroreflection by deflecting the light at the interface between the air in the space and the glass microspheres (page 3 of the Defendant's brief (3); the JPO Decision is to the same effect). With regard to such a retroreflective sheet, the first layer and the second layer, which are made of retroreflective material, the microspheres attached thereon, and the cover layer partially printed in white, can be understood as constituting a single technical idea, that is, retroreflective material that reflects the incident light from the headlights of vehicles at night and appears white in daylight, which is the purpose of Exhibit Ko 1 Invention (see the following Figure; the red part refers to the whited-colored printed part).



Thus, Exhibit Ko 1 Invention has a structure wherein there is a space between the cover layer 18, the printing layer that is colored in white on a single side or both sides of the cover layer 18 in a uniform pattern of multiple dots, and the microspheres 16; and the cover layer 18 is not attached to the assembly except adjacent to the edges of the piece of material. The space is provided to form a path of light of retroreflection. Therefore, a person skilled in the art who has come across Exhibit Ko 1 Invention is unable to recognize the problem of decline in retroreflective properties due to, for example, a blister in the printing layer caused by water, etc. penetrating into the space between the printing layer and the second layer 14. There is no motivation, on the assumption of such problem, to apply the Art Disclosed in Exhibit Ko 3

B. In addition, how to increase the retroreflective efficiency of retroreflective material

is a well-known problem. Even though it is known that a cube-corner retroreflective element has greater retroreflective efficiency than an element using micro glass spheres, the cover layer 18 and the printing layer that is colored in white on a single side or both sides of the cover layer 18 in a uniform pattern of multiple dots, which are contained in Exhibit Ko 1 Invention, are structured based on the structure using glass microspheres in a manner that they do not obscure or attenuate more than a limited amount of the retro-reflectivity at night and sufficient white color is present such that they appear white in daylight (lines 115 to 123, page 1). Therefore, there is no motivation to extract only the layer structure that is present between the printing layer and the backing material 10, while maintaining the aforementioned structure of the cover layer 18 and the white colored printing layer, and then replace it with the layer structure based on the Art Disclosed in Exhibit Ko 3, which consists of a triangular pyramidal cube-corner retroreflective material, the air layer, and the bonding material layer.

C. Even if it is assumed that with regard to the "space, glass microspheres, the second layer 14, and the first layer 12," which are among the structures of Exhibit Ko 1 Invention, there is motivation to apply the structures of "the bonding material layer (6), the air layer (3), the triangular pyramidal retroreflective element layer (1), and the holder layer (2)," which are among the structures of the Art Disclosed in Exhibit Ko 3, there is no evidence to find that the cover layer 18 can be structured in a manner that it makes contact with the holder layer.

D. Based on the above, there is no motivation to apply the Art Disclosed in Exhibit Ko 3 to Exhibit Ko 1 Invention, and even if there is any such motivation, a person skilled in the art would not be able to conceive of the structure wherein "the printing layer is installed between the holder layer and the surface protective layer in a manner that it makes contact with the holder layer and the surface protective layer" (Difference 1-1).

Accordingly, there is no motivation for a person skilled in the art to recognize problems such as a blister in the printing layer due to the installation of the printing layer between the holder layer and the surface protective layer and examine the area ratio of the independent printing area based on such recognition, and hence such person would not be able to conceive of the structure regarding Difference 1-4.

(5) Summary

Based on the above, the JPO Decision has errors at least in the decision on whether a person skilled in the art could have easily conceived of Differences 1-1 and 1-4. Invention 1 is not regarded as one that could have been easily conceived of by a person skilled in the art based on Exhibit Ko 1 Invention and the Art Disclosed in Exhibit Ko 3. Therefore, without the need to make determinations on the remaining issues, Grounds

for Rescission 1-1-2 alleged by the Plaintiff have grounds.

4. Grounds for Rescission 1-2-1 (Error in the findings of the common features and differences between Invention 2 and Exhibit Ko 1 Invention)

The Plaintiff alleged, as stated in No. 3, 3. (1) above, on the premise that there are errors in the findings of Exhibit Ko 1 Invention by the JPO Decision, that there are also errors in the findings of differences by the JPO Decision. However, as stated in 2. (1) above, there are no errors in the findings of Exhibit Ko 1 Invention by the JPO Decision.

In addition, Invention 2 has the same structure as Invention 1 except on the following points: [i] "the reflective elements are triangular pyramidal cube-corner retroreflective elements" and [ii] the thickness of the printing layer is "0.5 μm to 10 μm."

Then, regarding the differences between Invention 2 and Exhibit Ko 1 Invention, Difference 1-1 should be found as Difference 1-1' as found by the JPO Decision on the premise of the structure defined in [i], and Difference 1-5 should be found as Difference 1-5' as found by the JPO Decision on the premise of the structure defined in [ii], respectively, in addition to Differences 1-2 through 1-4.

Therefore, there are no errors in the findings of the common features and differences between Invention 2 and Exhibit Ko 1 Invention by the JPO Decision.

5. Grounds for Rescission 1-2-2 (Error in the decision on whether a person skilled in the art could have easily conceived of Invention 2 based on the differences found by the JPO Decision)

Based on the technical meaning of the Invention, Difference 1-1' and Difference 1-4 should be examined as an integrated structure as stated in 3. (1) above.

Difference 1-1' consists of the structure of Difference 1-1 with the addition of the point that "the reflective elements are triangular pyramidal cube-corner retroreflective elements" in Invention 2. There is no motivation to apply the Art Disclosed in Exhibit Ko 3 to Exhibit Ko 1 Invention. Even if there is any such motivation, a person skilled in the art would not be able to conceive of the structure wherein "the printing layer is installed between the holder layer and the surface protective layer in a manner that it makes contact with the holder layer and the surface protective layer" (Difference 1-1), and therefore, a person skilled in the art could not also have conceived of the structure of Difference 1-1'. In addition, as stated in 3. (4) above, there is no motivation for a person skilled in the art to recognize problems such as a blister in the printing layer due to the installation of the printing layer between the holder layer and the surface protective layer and examine the area ratio of the independent printing area based on such recognition, and hence such person would not also be able to conceive of the

structure regarding Difference 1-4.

Consequently, the JPO Decision contains errors at least in the decision on whether a person skilled in the art could have easily conceived of Differences 1-1' and 1-4. Invention 2 is not regarded as one that could have been easily conceived of by a person skilled in the art based on Exhibit Ko 1 Invention and the Art Disclosed in Exhibit Ko 3. Therefore, without the need to make determinations on the remaining issues, Grounds for Rescission 1-2-2 alleged by the Plaintiff have grounds.

6. Grounds for Rescission 2A-1-1 (Error in the findings of the common features and differences between Invention 1 and Exhibit Ko 2 Invention A)

(1) Error in the findings of Exhibit Ko 2 Invention A

A. Statements in Exhibit Ko 2 Document

(A) Exhibit Ko 2 Document has statements as shown in Attachment 3 (based on the translation in the JPO Decision). According to the statements, it is found that the following are disclosed concerning Exhibit Ko 2 Invention A.

a. The "present invention" is related to a retroflector plate and its manufacturing method.

A reflective traffic sign that consists of a metallic sheet coated with a reflective film in order to increase traffic safety at night is known. If a reflector plate is provided on a vehicle, the vehicle can be identified by its number plate even at night when the vehicle is illuminated. A publicly-known number plate is a non-reflective aluminum sheet coated with lacquer. After codes, letters, and/or numbers are embossed convexly, the convex parts are generally coated with black lacquer. (lines 4-9, page 1 and lines 13, page 1 to line 7, page 2)

b. The problem of the "present invention" is to provide a retroreflective surface and plate in order to increase safety during night traffic, and further increase the visibility of traffic roads and traffic control devices and the visibility of vehicles, and to provide a method to manufacture said reflective surfaces and plates (lines 8 to 14, page 2).

c. A retroreflective surface and plate based on the "present invention" consists of a reflector plate and is characterized by the following: the reflector plate has a plastic plate; wherein its visible surface is smooth; for which the back surface has a triangular prism ... has a reflective element formed by optical accuracy of ..., and is covered with a reflective layer provided with reflective coating; and on the visible surface of the reflector plate, letters and/or numbers, or other codes are engraved, embossed, or attached; and the triangular prism forms an upside-down triangular pyramid (line 15, page 2 through line 3, page 3); in cases where the reflector plate of the present invention is embossed, the triangular prism that is provided at the back of the convex codes is crushed, and therefore, the convex codes are no longer reflective (line 22, page 3

through line 5, page 4); in the example of a vehicle number plate, in order to show a visible surface, which is not embossed, in white and opaque during daylight, many white dots in the form of the "Raster" can be printed on the visible surface of the reflector plate and the "Raster" is created so that reflected light is transmitted at the predetermined percentage (lines 1 through 22, page 7).
(B) Considering the statements above together, Exhibit Ko 2 Invention A is found to be the invention as found by the JPO Decision.
B. On the other hand, as stated in No. 3, 5. (1) A. (B) above, the Plaintiff alleged that [i] regarding the point that "its visible surface is smooth" in Exhibit Ko 2 Invention A, letters, numbers, and other codes on the visible surface of the reflective surface are embossed and engraved in a convex form, and therefore, if it means that "the visible surface is a 'flat surface'," it is an error; and [ii] regarding the point that "many white dots in the form of the 'Raster' can be printed on the visible surface of the reflector plate," the details of technology cannot be understood by the term "Raster" alone; the "Raster" should be translated as "格子[grid]"; and Exhibit Ko 2 Document discloses that "many white dots in the form of a grid are printed on a part of the visible surface of the reflector plate other than the part of the codes."

However, as stated in A. (A) c. above, Exhibit Ko 2 Document has the statement that "A retroreflective surface and plate based on the present invention consists of a reflector plate and … : the reflector plate has a plastic plate; wherein its visible surface is smooth, … ." Following this statement, it is stated that letters and other codes are embossed on the visible surface of the reflector plate in a convex form. Based on the above, it can be construed that the visible surface other than the embossed part is "smooth." Therefore, the finding on the reflector plate of Exhibit Ko 2 Invention A to the effect that "its visible surface is smooth" contains no error.

Next, based on the evidence, it is found that the term "Raster" is translated as "格子[grid]", "網目版にする[net]" (Exhibit Ko 44), and "（網目スクリーンの）網目[mesh (of a mesh screen)]" (Exhibits Ko 49 and 51) in a German-Japanese dictionary; and it is translated as "grid" in English (Exhibit Ko 45) in a German-English dictionary; and "grid" is translated as "格子[grid]" (Exhibit Ko 46) and "等間隔の水平と垂直の棒または線でできた網状組織[net organization consists of equally spaced horizontal and vertical bars or lines]" (Exhibit Ko 48). Therefore, it is not appropriate to translate the term "Raster" as "格子[grid]" unambiguously. In addition, the question here is which part of the "Raster" has many white dots. As mentioned above, the "Raster" has the meaning of "mesh." In consideration of the following overall statements: "... in order to show ... in white and opaque during daylight, many white dots in the form of the

'Raster' can be printed on the visible surface of the reflector plate. A 'Raster' is created so that reflected light is transmitted at the predetermined percentage. When a 'Raster' is created in an opaque and light impermeable color, reflected light passes the gaps of the 'Raster,' and therefore, it does not absorb the color of the 'Raster.' Coloration of the reflector plate and the color of the 'Raster' are made so that the color of the visible surface conforms to the 'Raster' in daylight, in other words, the color looks as though it conforms to the 'Raster' ..." (lines 1 through 22, page 7), it can also be construed that "many white dots in the form of the 'Raster'" refer to a structure consisting of many dots that looks like a "mesh," in other words, a structure wherein independent multiple dots are provided in the form of a mesh. If so, Difference 2A-3 is not regarded as a substantial difference. In any case, it cannot be said that there is an error in the findings on the difference by the JPO Decision by setting aside the technical meaning of "Raster."

In addition, Exhibit Ko 2 Document has the following statement: "in order to show the 'visible surface that is not embossed' in white and opaque in daylight, many white dots in the form of the 'Raster' can be printed on the visible surface of the reflector plate. ... Based on another characteristic feature of the present invention, in order to distinguish codes and the visible surface of the reflector plate that does not include the codes by color, one side of the surface can be coated with transparent lacquer which makes the reflected light look in a corresponding color." (lines 1 through 22, page 7). Therefore, based on the first part of the above, the JPO Decision found that in order to show "the reflective surface on which codes are not included," in other words, the "visible surface that is not embossed," in white in daylight, many white dots in the form of the "Raster" are printed on the visible surface of the reflector plate. It is considered to be a reasonable finding. The aforementioned allegation of the Plaintiff is based on the statement in the second half of the above concerning "another characteristic feature of the present invention." And that the expression that should be construed literally as "one side of the surface" was twisted and construed as "a part of the top surface." Therefore, it cannot be accepted.

C. Based on the above, there is no error in the findings of Exhibit Ko 2 Invention A by the JPO Decision. In addition, the Plaintiff alleged other matters concerning errors in the findings of the JPO Decision, including whether the translation related to terms is appropriate, etc. However, none of them are relevant or have impact on the aforementioned conclusion.

(2) Common features and differences between Invention 1 and Exhibit Ko 2 Invention A

A. As stated in (1) above, there is no error in the findings of Exhibit Ko 2 Invention A by the JPO Decision. When it is compared with Invention 1 based on the findings, Invention 1 is different from Exhibit Ko 2 Invention A with regard to Differences 2A-1 through 2A-4 as found by the JPO Decision.

B. (A) On the other hand, the Plaintiff alleged, as stated in No. 3, 5. (1) B. (A) a. above, that the "reflector plate" and "sheet" in Exhibit Ko 2 Invention A are obviously different; in Exhibit Ko 2 Document, a "sheet" is stated to be related to prior art and it is clearly distinguished from the "plate"; and therefore, it is an error that the JPO Decision found that the "reflector plate" in Exhibit Ko 2 Invention A is a common feature with a "retroreflective sheet."

However, there is the following statement in the corresponding point in Exhibit Ko 2 Document as pointed out by the Plaintiff: "... The number plate that has been regarded to be publicly-known is a non-reflective aluminum sheet coated with lacquer. In cases of this plate, ..." (line 13, page 1 through line 7, page 2). However, it is followed by "The problem of the present invention is ... to provide a retroreflective surface and plate in order to increase ... visibility of vehicles" (lines 8 through 12, page 2); "in addition, the problem of the present invention is to provide a method to manufacture said reflector surface and plate." (lines 12 through 14, page 2); and "the retroreflective surface and plate of the present invention consist of a reflector plate ..." (line 15 and after, page 2) (underlines are provided by this court). Therefore, in Exhibit Ko 2 Document, the terms "sheet" and "reflector plate" are not used specifically to indicate different items. In addition, there is a statement that "The reflector plate of the present invention is embossed by the same method as publicly-known aluminum plates ..." (line 8 and after, page 3). Therefore, the "reflector plate" of Exhibit Ko 2 Invention A is regarded as being based on an item as thin as the publicly-known aluminum. Consequently, there is no error in the findings that the "reflector plate" of Exhibit Ko 2 Invention A is a common feature with the "retroreflective sheet" of Invention 1.

(B) The Plaintiff alleged, as stated in No. 3, 5. (1) B. (A) b. above, that since the specific structure of the "Raster" of Exhibit Ko 2 Invention A is unclear, the specific structure wherein "many white dots in the form of the 'Raster' are printed on the visible surface" cannot be identified and it is not regarded to be conforming to the structure wherein "the printing layer ... is provided" and "printed" in Invention 1.

However, even without identifying the specific technical meaning of the "Raster," since Exhibit Ko 2 Invention A has a structure wherein "many white dots in the form of the 'Raster' are printed on the visible surface" of the reflective surface that does not include codes, it is obvious that it has a "printed layer." In addition, the term "Raster"

is not always translated as "格子[grid]" in Japanese and it instead has room to construe that the "white dots" are arranged in a mesh pattern, as stated in (1) B. above.

(3) Summary

Based on the above, there is no error in the findings of Exhibit Ko 2 Invention A by the JPO Decision; there is no overlooking of differences in comparison between Invention 1 and Exhibit Ko 2 Invention A; and there is no error in the findings of differences by the JPO Decision.

7. Grounds for Rescission 2A-1-2 (Error in the determination on whether Invention 1 could have been easily conceived of by a person skilled in the art based on the difference found by the JPO Decision)

(1) Whether Difference 2A-1 and 2A-4 could have been easily conceived of by a person skilled in the art

A. As stated in 3. (1) above, in light of the technical meaning of Invention 1, Differences 2A-1 and 2A-4 that correspond to differences regarding the following parts from the structure of Invention 1 and Exhibit Ko 2 Invention A should be examined as one difference: [i] the printing layer is installed between the holder layer and the surface protective layer in a manner that it makes contact with the holder layer and the surface protective layer and [ii] the printing area of the printing layer forms an independent area and is arranged in a repeating pattern, and does not form a continuous layer, with the area of the independent printing area being 0.15 mm^2 to 30 mm^2.

B. Exhibit Ko 2 Invention A is a vehicle's number plate that is presumed to be used outside. It has a structure consisting of the triangular prism in an upside-down triangular pyramidal form, the reflector plate 14, the code 18 on the visible surface of the reflector plate 14, and wherein many white dots in the form of the "Raster" are printed on the visible surface of the reflector plate 14. There is no statement or suggestion of providing the surface protective layer on the white dots in the form of the "Raster."

Then, even if the "Raster" of Exhibit Ko 2 Invention A is used outside without the surface protective layer, having weatherability can be regarded as the premise of the use. Therefore, it cannot be regarded that there is no motivation to apply a structure with the surface protective layer to the part where the white dots in the form of the "Raster" are printed in Exhibit Ko 2 Invention A. A person skilled in the art who comes across Exhibit Ko 2 Invention A could not have conceived of the structure wherein "the printing layer is installed between the holder layer and the surface protective layer in a manner that it makes contact with the holder layer and the surface protective layer" (Difference 2A-1).

In addition, in this case, there is also no motivation for a person skilled in the art to

recognize problems such as a blister in the printing layer due to the installation of the printing layer between the holder layer and the surface protective layer and examine the area ratio of the independent printing area based on such recognition, and hence such person would not be able to conceive of the structure regarding Difference 2-4.

C. On the other hand, the Defendant alleged, as stated in No. 3, 6. (2) A. above, that covering the reflector plate that is used as a number plate of Exhibit Ko 2 Invention A with the protective layer is a well-known problem and there is a motivation to cover the reflector plate with the protective layer in order to solve the problem. However, Exhibit Ko 2 Document has no statements or suggestions to cover the reflector plate with the protective layer in the first place. As stated in B. above, the "Raster" of Exhibit Ko 2 Invention A is on the premise of having weatherability even if it is used outside without the surface protective layer. Even if protecting the visible surface of a number plate is a well-known problem, there is no motivation to have the additional structure to provide the surface protective layer over the part where the white dots in the form of the "Raster" are printed, and the aforementioned allegation of the Defendant is groundless.

(2) Summary

Based on the above, the JPO Decision contains errors in the determination on whether Differences 2A-1 and 2A-4 between Invention 1 and Exhibit Ko 2 Invention A could have been easily conceived of by a person skilled in the art. Invention 1 is not regarded as one that a person skilled in the art could have easily conceived of based on Exhibit Ko 2 Invention A and well-known art. Therefore, without the need to make determinations on the remaining issues, Grounds for Rescission 2A-1-2 alleged by the Plaintiff have grounds.

8. Grounds for Rescission 2A-2-1 (Error in the findings of the common features and differences between Invention 2 and Exhibit Ko 2 Invention A)

The Plaintiff alleged, as stated in No. 3, 7. (1) above, on the premise that there are errors in the findings of Exhibit Ko 2 Invention A by the JPO Decision, that there are errors in the findings of differences by the JPO Decision. However, as stated in 6. (1) above, there are no errors in the findings of Exhibit Ko 2 Invention A by the JPO Decision.

In addition, Invention 2 has the same structure as Invention 1 except the following points: [i] "the reflective elements are triangular pyramidal cube-corner retroreflective elements" and [ii] the thickness of the printing layer is "0.5 μm to 10 μm."

Then, differences between Invention 2 and Exhibit Ko 2 Invention A should be found in addition to Differences 2A-1 through 2A-3, and Difference 2A-4 should be found as Difference 2A-4' as found by the JPO Decision on the premise of the structure

defined in [ii].

Therefore, there are no errors in the findings of the common features and differences between Invention 2 and Exhibit Ko 1 Invention by the JPO Decision.

9. Grounds for Rescission 2A-2-2 (Error in the determination on whether Invention 2 could have been easily conceived of by a person skilled in the art based on the difference found by the JPO Decision)

Based on the technical meaning of the Invention, Differences 2A-1 and 2A-4' should be examined as an integrated structure as stated in 7. (1) A. above.

Then, even if the "Raster" of Exhibit Ko 2 Invention A is used outside without the surface protective layer, having weatherability can be regarded as the premise of the use. Therefore, it cannot be said that there is a motivation to apply a structure with the surface protective layer to the part where the white dots in the form of the "Raster" are printed in Exhibit Ko 2 Invention A. A person skilled in the art could not have conceived of the structure wherein "the printing layer is installed between the holder layer and the surface protective layer in a manner that it makes contact with the holder layer and the surface protective layer" (Difference 2-1) as stated in 7. (1) B. above. In addition, in this case, there is no motivation for a person skilled in the art to recognize problems such as a blister in the printing layer due to the installation of the printing layer between the holder layer and the surface protective layer and examine the area ratio of the independent printing area based on such recognition, and hence such person would not be able to conceive of the structure regarding Difference 2A-4' (the structure wherein the point that Invention 2 specified the thickness of the printing layer to be "0.5 μm to 10 μm" is added as a difference to Difference 2A-4).

Consequently, the JPO Decision contains errors at least in the determination on whether Differences 2A-1 and 2A-4' could have been easily conceived of by a person skilled in the art. Invention 2 is not regarded as one that could have been easily conceived of by a person skilled in the art based on Exhibit Ko 2 Invention A and well-known art. Therefore, without the need to make determinations on the remaining issues, Grounds for Rescission 2A-2-2 alleged by the Plaintiff has grounds.

10. Grounds for Rescission 2B-1-1 (Error in the findings of the common features and differences between Invention 1 and Exhibit Ko 2 Invention B)

(1) Error in the findings of Exhibit Ko 2 Invention B

A. Exhibit Ko 2 Document has the following statements in addition to the statements in 6. (1) A. (A) above: "All surfaces of a reflector plate can be provided with a lacquer coloring layer. ... The coloring layer consists of lacquer, foil, plastic, and various other materials and the layer can be coated by an injection molding method or can be inserted

in the injection mold of the reflector as a plastic plate." (lines 1 through 11, page 9); "All transparent or opaque colored lacquer coating on the visible surface of a reflector plate that is stated can be replaced with printed transparent foil. The foil is bonded with plastic materials of the reflector surface by bonding on the visible surface of the reflector or by, for example, inserting into a mold when implementing injection molding of the reflector." (lines 12 through 27, page 9; underlines are provided by this court); "According to FIG. 11, the coloring layer 35 consisting of lacquer, membrane, and plastic was provided on the entirety of the visible surface 34 of the reflector plate during or after the casting or injection molding process. The coated plate is embossed, like the reflector plate 14 in FIG. 3 and FIG. 4. Subsequently, the embossed front surface of the code 36 of the layer 35 is polished by the rotary disc 37 and, in accordance with this process, the reflector plate 34 thus coated can be transferred in the direction of the arrow 38. Then, the coloring layer of the convex code 36 is eliminated, and, on the other hand, the coloring layer of the non-convex surface is maintained." (line 16, page 14 through line 2, page 15). FIG. 11 and FIG. 12 are as shown below.

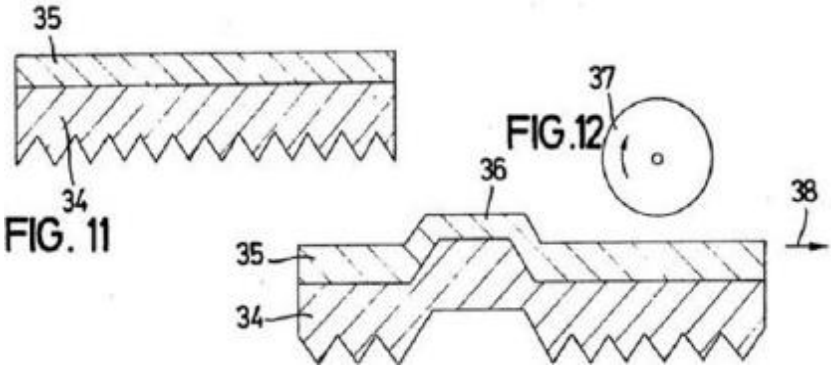


FIG. 11

FIG.12

Considering the statements, etc. above together, it is found that Exhibit Ko 2 Invention B is as found by the JPO Decision.

B. On the other hand, the Plaintiff alleged, as stated in No. 3, 9. (1) A. above, that, concerning the part of Exhibit Ko 2 Invention B found by the JPO Decision as "the visible surface is smooth," if it means that "the visible surface is smooth" "even during or after the casting or injection molding," the JPO Decision is in error. However, as stated in 6. (1) B. above, according to the statements in Exhibit Ko 2 Document, it can be construed that the visible surface other than the embossed part is "smooth." Therefore, there is no error in the findings by the JPO Decision regarding the reflector plate of Exhibit Ko 2 Invention A that "the visible surface is smooth" and the aforementioned allegation of the Plaintiff is groundless.

(2) Common features and differences between Invention 1 and Exhibit Ko 2 Invention B

A. As stated in (1) above, there is no error in the findings of Exhibit Ko 2 Invention B by the JPO Decision. When it is compared with Invention 1 based on the findings, Invention 1 is different from Exhibit Ko 2 Invention B with regard to Differences 2B-1 through 2B-4 as found by the JPO Decision.

B. (A) On the other hand, the Plaintiff alleged, as stated in No. 3, 9. (1) B. (A) a. above, that the "coloring layer" which is "a transparent foil" in Exhibit Ko 2 Invention B is polished and eliminated, and therefore, it does not protect the surface of the reflector plate 34 and cannot be the "surface protective layer"; consequently, the JPO Decision overlooked the difference in this regard.

However, the printed transparent foil, which is a substitute for the transparent or opaque lacquer coating on the visible surface of a reflector plate in Exhibit Ko 2 Invention A, is specified as "The foil is bonded with plastic materials of the reflector surface by bonding on the visible surface of the reflector or by inserting into a mold when implementing injection molding of the reflector." (lines 12 through 27, page 9). Based on the statement, the foil can be construed to cover the visible surface of the reflector plate and, after the convex codes on the front surface are eliminated after embossing, "the coloring layer of non-convex surface is maintained." (line 16, page 14 through line 2, page 15). Therefore, concerning parts other than the eliminated codes, since the visible surface is regarded as being protected by the transparent foil, the "transparent foil" of Exhibit Ko 2 Invention B is equivalent to the "surface protective layer" of Invention 1.

Therefore, there is no overlooking of the difference by the JPO Decision as alleged by the Plaintiff.

(B) The Plaintiff also alleged, as stated in No. 3, 9. (1) B. (A) b. above, that, based on the fact that Exhibit Ko 2 Document only stated that "the coloring layer 35" is provided and that the "transparent or opaque coloring lacquer coating on the visible surface of a reflector plate can be replaced with printed transparent foil," Exhibit Ko 2 Invention B does not have a printed layer, and therefore, the JPO Decision overlooked the difference in this regard.

However, Exhibit Ko 2 Document has the following statements: [i] "All surfaces of a reflector plate can be provided with a lacquer coloring layer. ..." (line 1 and after, page 9); [ii] "... All transparent or opaque colored lacquer coating on the visible surface of a reflector plate that is stated can be replaced with printed transparent foil. ..." (lines 12 through 27, page 9); and [iii] According to FIG. 11, the coloring layer 35 consisting of lacquer ... was provided on the entirety of the visible surface 34 of the reflector plate during or after the casting or injection molding process. ..." (line 16 and after, page 14).

Referring to these statements and FIG. 11, the coloring layer 35 consisting of lacquer on the entire visible surface of reflector plate 34 can be replaced with the "printed transparent foil" and the coloring layer of the "printed transparent foil" is seen as corresponding to the printing layer. Therefore, there is no error in the JPO Decision in that it did not find this point to be a difference in the comparison of Invention 1 and Exhibit Ko 2 Invention B.

(3) Summary

Based on the above, there is no error in the findings of Exhibit Ko 2 Invention B by the JPO Decision; there is no overlooking of differences in the comparison between Invention 1 and Exhibit Ko 2 Invention B; and there is no error in the findings of differences by the JPO Decision.

11. Grounds for Rescission 2B-1-2 (Error in the determination on whether Invention 1 could have been easily conceived of by a person skilled in the art based on the differences found by the JPO Decision)

(1) Whether Difference 2B-3 could have been easily conceived of by a person skilled in the art

A. The "coloring layer, which is a printed transparent foil" of Exhibit Ko 2 Invention B is replaced with the coloring lacquer coating on the visible surface of the reflector plate (lines 12 through 27, page 9; see the underlined part in 10. (1) A. above). And concerning the coloring layer 35 of Exhibit Ko 2 Invention B, "… The foil is bonded with plastic materials of the reflector surface by bonding on the visible surface of the reflector or by inserting into a mold when implementing injection molding of the reflector." (lines 12 through 27, page 9). Exhibit Ko 2 Document has no statements or suggestions to replace said printed transparent foil with many white dots in the form of the "Raster." Therefore, it cannot be regarded that a person skilled in the art who comes across Exhibit Ko 2 Document is motivated to provide many white dots in the form of the "Raster" as a substitute for the "printed foil."

In this case, a person skilled in the art could not have conceived of applying the structure with the independent printing area to Exhibit Ko 2 Invention B. Therefore, a person skilled in the art is not motivated to consider the area of the independent printing area additionally.

B. On the other hand, the Defendant alleged, as stated in No. 3, 10. (2) C. above, that if a person skilled in the art gives a shape to the "printed transparent foil," it is considered that he/she refers to many white dots in the form of the "Raster" "in order to show the visible surface in white and opaque during daylight" "so that reflected light transmitted at the predetermined percentage." Exhibit Ko 2 Document has no statements

related to these points. Instead of this fact, it cannot be said that a person skilled in the art who comes across Exhibit Ko 2 Document is motivated to replace the "printed foil" of Exhibit Ko 2 Invention B with many white dots in the form of the "Raster." Therefore, the aforementioned allegation of the Defendant is groundless.

(2) Summary

Based on the above, the JPO Decision has errors on the determination on whether Difference 2B-3 between Invention 1 and Exhibit Ko 2 Invention B could have been easily conceived of by a person skilled in the art. Invention 1 is not regarded as one that could have been easily conceived of by a person skilled in the art based on Exhibit Ko 2 Invention B and well-known art. Therefore, without the need to make determinations on the remaining issues, Grounds for Rescission 2B-1-2 alleged by the Plaintiff has grounds.

12. Grounds for Rescission 2B-2-1 (Error in the findings of the common features and differences between Invention 2 and Exhibit Ko 2 Invention B)

The Plaintiff alleged, as stated in No. 3, 11. (1) above, on the premise that there are errors in the findings of Exhibit Ko 2 Invention B by the JPO Decision that there are errors in the findings of differences by the JPO Decision. However, as stated in 10. (1) above, there are no errors in the findings of Exhibit Ko 2 Invention B by the JPO Decision.

In addition, Invention 2 has the same structure as Invention 1 except the following points: [i] "the reflective elements are triangular pyramidal cube-corner retroreflective elements" and [ii] the thickness of the printing layer is "0.5 μm to 10 μm."

Then, differences between Invention 2 and Exhibit Ko 2 Invention B should be found in addition to Differences 2B-1 through 2B-3, and Difference 2B-4 should be found as Difference 2B-4' as found by the JPO Decision on the premise of the structure defined [ii].

Therefore, there are no errors in findings of the common features and differences between Invention 2 and Exhibit Ko 2 Invention B by the JPO Decision.

13. Grounds for Rescission 2B-2-2 (Error in the determination on whether Invention 2 could have been easily conceived of by a person skilled in the art based on the differences found by the JPO Decision)

As stated in 11. (1), there is an error in the JPO Decision on whether a person skilled in the art could have easily conceived of Difference 2B-3.

Then, it cannot be said that Invention 2 could have been easily conceived of by a person skilled in the art based on Exhibit Ko 2 Invention B and well-known art. Therefore, Grounds for Rescission 2B-2-2 alleged by the Plaintiff has grounds.

14. Grounds for Rescission 3 (Error in the determination on the violation of the support requirements)

(1) Article 36, paragraph (6), item (i) of the Patent Act stipulates that the statements in the claims must not exceed the scope of the invention stated in the detailed explanation of the invention. The reason is because, if an invention that is not stated in the detailed explanation of the invention is stated in the claims, it results in demanding exclusive rights for an invention that has not been published and it is not appropriate. Thus, the purport of the provisions is construed to prevent such a situation.

Then, it is reasonable to construe that whether a statement in the claims conforms to the requirements as set forth in said item (support requirements) should be determined by comparing the statement in the claims and the statement in the detailed explanation of the invention and by examining [i] whether an invention stated in the claims is an invention stated in the detailed explanation of the invention and the invention is in the scope where a person skilled in the art can recognize that the problems of the invention can be solved based on the statement in the detailed explanation of the invention and [ii] whether it is in the scope where a person skilled in the art can solve the problems of the invention in light of the common general technical knowledge at the time of filing of the application even without any statements or suggestions in the detailed explanation of the invention.

(2) The detailed explanation of the invention in the Description has the following statements: "The present invention is related to a cube-corner retroreflective sheet that is comprised of a triangular pyramidal cube-corner retroreflective element (hereinafter simply referred to as a "triangular pyramidal retroreflective element" in some cases) that is useful for signs, such as road signs, construction signs, etc.; number plates for vehicles, such as automobiles and motorcycles, etc.; safety materials for clothing and life-saving devices, etc.; and reflector plates, etc. of markings for commercial signs, etc., visible lights, laser beams, or infrared reflection type sensors." ([0002]); "A retroreflective sheet that reflects incident light towards the light source has been well known. Said sheets using the retroreflective properties are widely used in the aforementioned areas. In particular, a cube-corner retroreflective sheet that uses the retroreflection principle of cube-corner retroreflective elements, such as triangular pyramidal retroreflective elements, etc., and a triangular pyramidal cube-corner retroreflective sheet, wherein a vapor deposition layer is provided on the side of reflection of the aforementioned reflective element (hereinafter referred to as a "vapor deposition-type triangular pyramidal cube-corner retroreflective sheet") have a dramatically excellent light retroreflective efficiency compared to conventional

retroreflective sheets that use micro glass spheres. Thanks to the excellent retroreflective performances, the use of retroreflective sheets is expanding year by year." ([0003]); "However, the vapor deposition-type triangular pyramidal cube-corner retroreflective sheet has a defect that it is affected by the metal color and its appearance becomes dark due to the nature of the retroreflective element." ([0004]); "In order to improve the hue of the triangular pyramidal cube-corner retroreflective sheet and metal vapor deposition-type triangular pyramidal cube-corner retroreflective sheet, the attempt has also been made to provide a consecutive printing layer on part of the retroreflective sheet." ([0008]); "There are the following types of retroreflective sheets, in addition to the aforementioned triangular pyramidal cube-corner retroreflective sheet and vapor deposition-type triangular pyramidal cube-corner retroreflective sheet: sealing-type retroreflective sheet, capsule lens-type retroreflective sheet, etc. The same attempt to provide a printing layer as the Application has been made with these sheets." ([0009]); "However, the printing layer has slightly less adhesion with both the reflective element and surface protective layer and has defects, such as that the layer itself has less weatherability and it may cause a blister in the weatherability test, or it easily absorbs water. It also has the defect that if a consecutive printing layer is provided on a triangular pyramidal cube-corner retroreflective sheet or vapor deposition-type triangular pyramidal cube-corner retroreflective sheet, adhesion around the printing layer decreases, and therefore, it is inferior in weatherability and water resistance." ([0012]); "In addition, the sealing-type retroreflective sheet and the capsule lens-type retroreflective sheet originally have less retroreflective properties than the triangular pyramidal cube-corner retroreflective sheet or the vapor deposition-type triangular pyramidal cube-corner retroreflective sheet, and they have a defect that if the printing layer is provided, they cannot satisfy the retroreflective properties." ([0013]); "In light of the defects in the prior art as above, the present invention provides a retroreflective sheet for which the hue is improved by employing a very simple and inexpensive method." ([0014]); "The present inventor, etc. examined various hues of triangular pyramidal cube-corner retroreflective sheets and metal vapor deposition-type triangular pyramidal cube-corner retroreflective sheets. As a result, they found retroreflective sheets with excellent weatherability and water resistance and improved hue by providing a printing layer on the reflective element layer or the surface protective layer of the retroreflective sheet and completed the present invention." ([0015]).

Taking into account all of these statements, it is found that the Invention provides a retroreflective sheet with improved hue which solves the defect of prior art—poor weatherability and water resistance in the case where a printing layer is provided on a

triangular pyramidal cube-corner retroreflective sheet or a vapor deposition-type triangular pyramidal cube-corner retroreflective sheet in order to improve the hue of these sheets—by employing a very simple and inexpensive method.

(3) Then, concerning the Invention, the following are examined below: whether the invention stated in the claims is the invention stated in the detailed explanation of the invention; and in light of the aforementioned statements in the detailed explanation or common general technical knowledge at the time when the Application was filed, whether the Invention is in the scope where a person skilled in the art could recognize that the Invention can solve the aforementioned problem of the Invention.

A. The detailed explanation of the invention of the Description has the following statements: as the "best embodiment of the invention," "A retroreflective sheet that is used for the Invention is preferred to be a triangular pyramidal cube-corner retroreflective sheet or vapor deposition-type triangular pyramidal cube-corner retroreflective sheet consisting of at least a reflective element layer, which consists of many reflective elements and a holder layer, and a surface protective layer, which is provided on the reflective element layer." ([0018]); "For the reflective element layer that is used for the present invention and consists of reflective elements and a holder layer, the reflective element layer, which is publicly-known as a reflective element layer of a triangular pyramidal cube-corner retroreflective sheet or a vapor deposition-type triangular pyramidal cube-corner retroreflective sheet, can be used." ([0019]); "(4) is a reflective element layer of the present invention, where triangular pyramidal reflective elements are arranged in the closest packing state; (3) is a holder layer for holding the reflective elements; and (11) is the incident direction of light. A reflective element layer (4) and a holder layer (3) are usually integrated (5); however, separate layers can be laminated. Based on the objective and environment for the use of the retroreflective sheet in the present invention, a surface protective layer (1), a printing layer for coloring to adjust hue (2), a bonding agent layer (7) for achieving the sealing structure to prevent water from entering into the back surface of the reflective element layer (4), a holding layer (8) for supporting the bonding agent layer (7), and an adhesive agent layer (9) and a separating material layer (10) that are used to attach the retroreflective sheet to another structure can be provided." ([0021]); "The printing layer (2) can usually be provided between the surface protective layer (1) and the holder layer (3), on the surface protective layer (1) or on the reflective surface of the reflective element layer (4), or on the surface protective layer. If the surface protective layer (1) has two or more layers, the printing layer (2) can be provided between the surface protective layers." ([0022]); "As examples of materials that can be used for the reflective element layer (4) in the

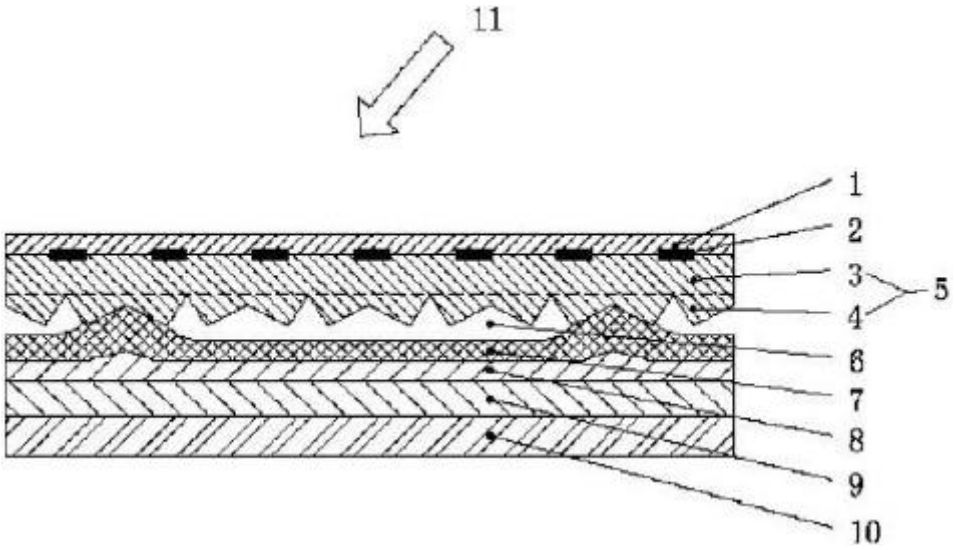
present invention are polycarbonate resin, ... and other materials." ([0025]); "The same resin as used for the reflective element layer (4) can be used for the surface protective layer (1). In particular, … (meth)acrylic resin, which have excellent weatherability, solvent resistance, printing performance, etc. are preferred." ([0026]); "The area of the independent printing area of the printing layer (2) of the present invention is 0.15 mm^2 to 30 mm^2, preferably 0.2 mm^2 to 25 mm^2, and more preferably 0.4 mm^2 to 15 mm^2." ([0029]); "If the area of the independent printing area is 0.15 mm^2 or more, it is preferable since it has excellent molding properties and the hue can be easily adjusted. If it is 30 mm^2 or less, it is preferable since it does not decrease the interlayer adhesion strength between the two layers sandwiching the printing layer (2) in the surrounding area of the printing area." ([0030]); "The thickness of printing layer (2) is not specifically limited; however, it is preferable for it to be 0.5 μm to 10 μm, preferably 1 μm to 5 μm, and more preferably 2 μm to 4 μm." ([0031]); "If the thickness of printing layer (2) is 0.5 μm or more, it is preferable since it has excellent molding properties and the hue can be easily adjusted. If it is 10 μm or less, it is preferable since it does not decrease the interlayer adhesion strength between the two layers sandwiching the printing layer (2) in the surrounding area of the printing area." ([0032]); "The coloring agent that is used in the present invention is not specifically limited; however, it is preferred to be a coloring agent that can brighten the hue and have concealing properties and a light color conforming to the sheet's hue is preferred. For example, there are white organic pigments, white and yellow inorganic pigments, and fluorescent dyes and fluorescent brighteners. In particular, white and yellow inorganic pigments that have better concealing properties are preferred." ([0036]).

According to the detailed explanation of the invention contained in the Description indicated above, the Invention can be regarded as an invention stated in the detailed explanation of the invention.

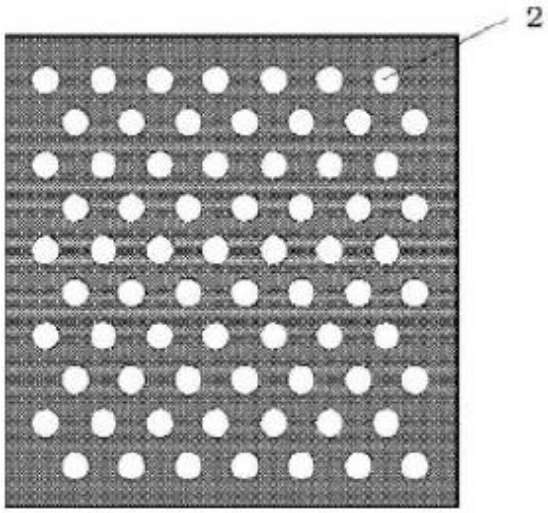
B. In the detailed explanation of the invention in the Description, the experimental results of the comparison between the following working examples and comparative examples are disclosed (Table 1 (shown below)): Working Example 1 (a triangular pyramidal cube-corner retroreflective sheet (printing thickness is approximately 2 μm) as shown in FIG. 1 (shown below), on which gravure printing is provided using a printing ink in a staggered form with 2 mm-diameter circular printing pattern at 4 mm pitch as shown in FIG. 4 using an acrylic resin film with a thickness of 70 μm ("Sunduren LHB" manufactured by Mitsubishi Rayon Co. Ltd.); [0057] through [0067]); Working Example 2 (a vapor deposition-type triangular pyramidal cube-corner retroreflective sheet that is created under the conditions of Working Example 1; [0068]

and [0069]); and Working Example 3 (a vapor deposition-type triangular pyramidal cube-corner retroreflective sheet (printing thickness is approximately 2 μm), on which gravure printing is provided on a polycarbonate resin surface using a printing ink created in Working Example 1 in a staggered form with 1 mm-diameter circular printing pattern at 3 mm pitch as shown in FIG. 4 (shown below), and for which compression molding is implemented under the same conditions as Working Example 1, and on which a sealing structure and adhesive layer are provided; [0070] through [0074]); as well as Comparative Example 1 (the same as Working Example 1 except for the printing pattern that used the pattern shown in FIG. 6 (shown below).); and Comparative Example 2 (the same as Working Example 2 except for the printing pattern that used the pattern shown in FIG. 6.).

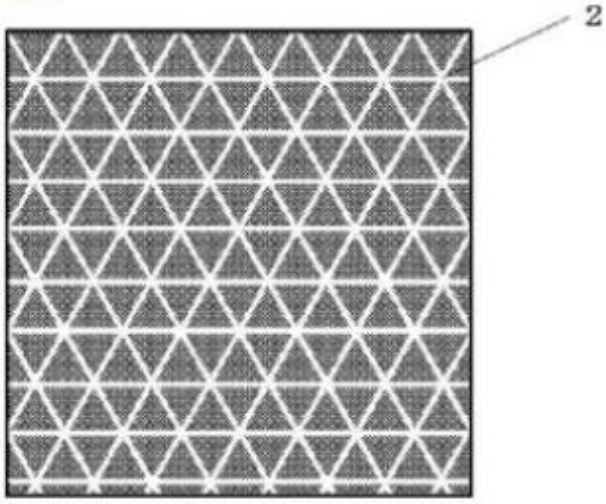
[FIG. 1]



[FIG. 4]



[FIG. 6]



(Table 1)

	Working Example 1	Working Example 2	Working Example 3	Comparative Example 1	Comparative Example 2
Retroreflective properties	430	615	512	457	534
Y value	46	28	25	48	28
Appearance after the weatherability test	No abnormality	No abnormality	No abnormality	Blister in the printed part	Blister in the printed part

In light of the laminated structure indicated in FIG. 1, Working Examples 1 to 3 comprise a "reflective element layer consisting of a reflective element and a holder layer" and a "surface protective layer installed on the reflective element layer" and "a printing layer is installed between the holder layer and the surface protective layer." As FIG. 4 (unlike FIG. 6) shows that printing areas are arranged in a staggered form, "the printing area forms an independent area and is arranged in a repeating pattern," and it "does not form a continuous layer." The area of the independent printing area is 1 mm^2 in Working Examples 1 and 2, and 0.25 mm^2 in Working Example 3. The printing layer is a retroreflective sheet of 2 μm in thickness which is printed using pigments such as titanium oxide ([0061]). In these examples, there was no abnormality in terms of retroreflective properties and the appearance after the weatherability test, whereas in the comparative examples (the pattern without an independent printing area in FIG. 6), the generation of a blister in the printing layer was disclosed.

In view of the statements in individual paragraphs in the Description as shown in A. above and the results of the comparative tests above, it can be said that the detailed explanation of the invention contained in the Description provides disclosure to the extent that a person skilled in the art would be able to recognize that the retroreflective sheet that satisfies the matters specifying the Invention can solve the problem targeted by the Invention as found in (2) above.

C. The JPO Decision found that with regard to the laminated structure of the "holder layer," the "surface protective layer" and the "printing layer," the "claims" of the Invention only state that "the printing layer is installed between the holder layer and the surface protective layer in a manner that it makes contact with the holder layer and the surface protective layer" and there is no statement specifying whether the "holder layer" makes contact with the "surface protective layer." On these grounds, the JPO Decision determined that the Invention lacks the structure wherein the "holder layer" and the "surface protective layer" are bonded together with a width where adhesion is secured.

However, as the Invention relates to a retroreflective sheet used for signs, such as road signs, construction signs, etc., and number plates for vehicles such as automobiles and motorcycles ([0002]), it can be said that the Invention is necessarily supposed to be used outside, and it can also be said that requiring a certain degree of weatherability for a retroreflective sheet is in itself common general technical knowledge. The Description states that in order to improve the hue of the conventional retroreflective sheet based on prior art, attempts have been made to provide a continuous printing layer on part of the retroreflective sheet, but the printing layer has defects such that its adhesion with the surface protective layer is slightly inferior, and a blister is generated in the weatherability test and it is also easy to absorb water ([0008], [0009], [0012]). In light of these circumstances, it is unreasonable to consider that the "claims" of the Invention lack the structure of a retroreflective sheet wherein the holder layer and the surface protective layer are bonded together with a width where adhesion is secured only because the "claims" do not contain a statement specifying whether the holder layer and the surface protective layer make contact with each other. Rather, it should be considered that the adhesion between these layers is taken as a given (even in light of the terms, "surface protective layer" and "holder layer," and their nature, it is difficult to assume that these layers are bonded purposefully with a width where adhesion is not secured).

In addition, the Defendant alleged, as stated in No. 3, 13 (2) above, that the JPO Decision questioned not only the point that it is not specified that the "holding layer"

and the "surface protective layer" come into contact, but also the point that it cannot be said that parts without the "independent printing area" of the "holder layer" and the "surface protective layer" in Invention 1 come into contact in the width to keep adhesion; and since the "retroreflective sheet" lacking the aforementioned structure includes a form that is not evaluated as showing "no abnormality" in the weatherability test as stated in [0054] in the Description, a violation of the support requirements is found.

However, in the Invention, as stated above, since the fact that the "surface protective layer" and the "holder layer" have adhesion is used as a natural premise, the Defendant's allegation has an error in its premise and cannot be accepted.

Therefore, the determination by the JPO Decision that the Invention did not fulfill the support requirements misunderstood the premise of the determination, and therefore, it was in error.

15. Conclusion

Based on the above, Grounds for Rescission 1-1-2, 1-2-2, 2A-1-2, 2A-2-2, 2B-1-2, 2B-2-2, and 2B-2-3 have grounds from among the Grounds for Rescission alleged by the Plaintiff, and therefore, the JPO Decision should be rescinded.

Consequently, the judgment shall be rendered as indicated in the main text.

Intellectual Property High Court, Fourth Division
Presiding judge: KANNO Masayuki
Judge: NAKAMURA Kyo
Judge: OKAYAMA Tadahiro

(Attachment 1)
[Detailed explanation of the invention]
[Technical field]
[0001]

The present invention relates to a triangular pyramidal cube-corner retroreflective sheet having a novel structure. More particularly, the present invention relates to a triangular pyramidal cube-corner type retroreflective sheet characterized by a printing layer for improving the hue provided on part of the triangular pyramidal cube-corner type retroreflective sheet.
[0002]

More particularly, the present invention is related to a cube-corner retroreflective sheet that is comprised of a triangular pyramidal cube-corner retroreflective element (hereinafter simply referred to as a "triangular pyramidal reflective element" in some cases) that is useful for signs, such as road signs, construction signs, etc.; number plates for vehicles, such as automobiles and motorcycles, etc.; safety materials for clothing and life-saving devices, etc.; and reflector plates, etc. of markings for commercial signs, etc., visible lights, laser beams, or infrared reflection type sensors."
[Background art]
[0003]

A retroreflective sheet that reflects incident light towards the light source is well known. Said sheets using the retroreflective properties are widely used in the aforementioned areas. In particular, a cube-corner retroreflective sheet that uses the retroreflection principle of cube-corner retroreflective elements, such as triangular pyramidal retroreflective elements, etc., and a triangular pyramidal cube-corner retroreflective sheet, wherein a vapor deposition layer is provided on the side of reflection of the aforementioned reflective element (hereinafter referred to as a "vapor deposition-type triangular pyramidal cube-corner retroreflective sheet") have a dramatically excellent light retroreflective efficiency compared to conventional retroreflective sheets that use micro glass spheres. Thanks to the excellent retroreflective performances, the use of retroreflective sheets is expanding year by year.
[0004]

However, the vapor deposition-type triangular pyramidal cube-corner retroreflective sheet has a defect that it is affected by the metal color and its appearance becomes dark due to the nature of the retroreflective element.
[0005]

Concerning these retroreflective sheets and their manufacturing methods, for

example, a triangular pyramidal cube-corner retroreflective sheet is stated in Patent Document 1, etc.; for example, a vapor deposition-type triangular pyramidal cube-corner retroreflective sheet is stated in Patent Document 2, etc. Citation of these documents substitutes as their specific statements here.

[0006]

Statements concerning the triangular pyramidal cube-corner retroreflective sheet characterized by the following are found in Patent Application No. 2000-72279 and the citation of the document substitutes as the specific statements thereof here: wherein the triangular pyramidal cube-corner retroreflective element is a pair of retroreflective elements segmented by three nearly orthogonally intersecting side surfaces (surface a1, surface b1, surface c1; surface a2, surface b2, surface c2; ...) by mutual intersection of V-shaped grooves, for which cross-section surface is substantially symmetrical, and is arranged on a common bottom surface (Sx-Sx') so as to be projected in the closest packing state; wherein the pair of triangular pyramidal retroreflective elements has a pair of side surfaces (surface c1, surface c2) facing each other and sharing a base (x); wherein the bottom surface (Sx - Sx') is a common flat surface containing the base (z, z) of one side surface (surface a1, surface a2) and side surface (y, y) of another side surface (surface b1, surface b2) of the pair of triangular pyramidal retroreflective elements; the pair of triangular pyramidal retroreflective elements sharing the base (x) has side surfaces (surface c1, surface c2) that face each other and have different shapes; and wherein the heights from the bottom surface (Sx-Sx') to the vertex are different from each other.

[0007]

Statements concerning the triangular pyramidal cube-corner retroreflective element sheet characterized by the following are found in International Publication No. WO98/18028 and the citation of the document substitutes as the specific statements thereof here: wherein the triangular pyramidal cube-corner retroreflective elements project on a common bottom surface (Sx-Sx'), share one base on the bottom surface (Sx-Sx') with each other, and are arranged in the closest packing state on the bottom surface by facing each other; wherein the bottom surface (Sx-Sx') is a common flat surface containing many bases (x, x, ...) shared by the triangular pyramidal retroreflective elements; wherein two triangular pyramidal reflective elements that face each other form a pair of elements that are substantially in the same shape and face substantially symmetrically against a flat surface (Y-Y', Y-Y', …) perpendicular to the bottom surface including a common base (x, x, …) on the bottom surface (Sx – Sx'); wherein the triangular pyramidal reflective elements consist of substantially the same

pentagonal inclined surfaces (surface c1, surface c2) that include the shared base (x, x, ...) as a side, and substantially the same square inclined surfaces (surface a1, surface b1; surface a2, surface b2) that have the two top sides of the aforementioned surface c1 or surface c2, which starts from the vertexes of the triangular pyramidal reflective element (H1, H2) as one of its sides and substantially intersects orthogonally with said surface c1 or surface c2, which shares one of the ridge lines of the triangular pyramidal reflective element and uses it as one of its sides; wherein the height (h') to the bottom surface (Sx-Sx') containing the base (x, x, ...) of the pentagonal inclined surfaces (surface c1, surface c2) of the triangular pyramidal reflective element is substantially higher than the height (h) from the vertexes (H1, H2) of the triangular pyramidal reflective element to the substantially horizontal surface (virtual surface S-S') containing the base (z, w) of the other inclined surfaces (surface a1, surface b1; surface a2, surface b2) of the triangular pyramidal retroreflective element.

[0008]

In order to improve the hue of the triangular pyramidal cube-corner retroreflective sheet and metal vapor deposition-type triangular pyramidal cube-corner retroreflective sheet, the attempt has also been made to provide a consecutive printing layer on part of the retroreflective sheet.

[0009]

There are the following types of retroreflective sheets, in addition to the aforementioned triangular pyramidal cube-corner retroreflective sheet and vapor deposition-type triangular pyramidal cube-corner retroreflective sheet: sealing-type retroreflective sheet, capsule lens-type retroreflective sheet, etc. The same attempt to provide a printing layer as the Application has been made with these sheets.

[0010]

Here, the sealing-type retroreflective sheet consists of a light transmissive holder layer; a layer of many micro glass spheres wherein nearly the half-sphere thereof is embedded and supported in a way so that they substantially align on one layer on the surface opposite the light incident side of the light transmissive holder layer; a light transmissive focus layer that is formed along with the surface of nearly half-sphere part on the side where the micro glass spheres are not embedded and that is provided with a thickness so that a substantial focus of the micro glass spheres is set on the surface of the side which does not come into contact with said micro glass spheres; and a light reflective metallic membrane that is formed on the surface on the side that does not come into contact with the micro glass spheres of the focus layer, and it has an additional light transmissive surface protective layer laminated on the surface on the

light incident side as necessary.

[0011]

Further, the capsule lens-type retroreflective sheet consists of a light transmissive covering layer; a holder layer; a layer of lens-type retroreflective elements that are provided on the surface on the side facing the light transmissive covering layer of the holder layer and in which half spheres of many micro glass spheres are embedded and supported in a way that they substantially align on one layer and the embedded half-sphere is covered with a light reflective metallic membrane; and an air layer between the light transmissive covering layer and the lens-type retroreflective element; wherein the air layer is formed by creating a clearance between the light transmissive covering layer and the holder layer and by partially connecting both layers with a connecting unit; and wherein the connecting unit divides the clearance into many sealed small cavities.

[0012]

However, the printing layer has slightly less adhesion with both the reflective element and surface protective layer and has defects, such as that the layer itself has less weatherability and it may cause a blister in the weatherability test, or it easily absorbs water. It also has the defect that if a consecutive printing layer is provided on a triangular pyramidal cube-corner retroreflective sheet or vapor deposition-type triangular pyramidal cube-corner retroreflective sheet, adhesion around the printing layer decreases, and therefore, it is inferior in weatherability and water resistance.

[0013]

In addition, the sealing-type retroreflective sheet and the capsule lens-type retroreflective sheet originally have less retroreflective properties than the triangular pyramidal cube-corner retroreflective sheet or the vapor deposition-type triangular pyramidal cube-corner retroreflective sheet, and they have a defect that if the printing layer is provided, they cannot satisfy the retroreflective properties.

[Patent Document 1] Description of US Patent No. 3,417,959

[Patent Document 2] Unexamined Patent Application Publication No. 1974-106839 (Description of US Patent No. 3,712,706)

[Disclosure of invention]

[Problems to be solved by the invention]

[0014]

In light of the defects in the prior art as above, the present invention provides a retroreflective sheet for which the hue is improved by employing a very simple and inexpensive method.

[0015]

The present inventor, etc. examined various hues of triangular pyramidal cube-corner retroreflective sheets and metal vapor deposition-type triangular pyramidal cube-corner retroreflective sheets. As a result, they found retroreflective sheets with excellent weatherability and water resistance and improved hue by providing a printing layer on the reflective element layer or the surface protective layer of the retroreflective sheet and completed the present invention.

[Means of solving problems]

[0016]

Thus, the present invention provides a printed retroreflective sheet, which is a retroreflective sheet consisting of at least a reflective element layer, which consists of many reflective elements and a holder layer, and a surface protective layer, which is installed on the reflective element layer, and is characterized by; wherein polycarbonate resin is used for the reflective element layer and (meth)acrylic resin is used for the surface protective layer; wherein the printing layer is installed between the holder layer and the surface protective layer in a manner that it makes contact with the holder layer and the surface protective layer; wherein the printing area of the printing layer forms an independent area and is arranged in a repeating pattern, and does not form a continuous layer, with the area of the independent printing area being 0.15 mm^2 to 30 mm^2; and wherein the printing layer contains titanium oxide as a white inorganic pigment.

[Best embodiment of the invention]

[0017]

Hereinafter, a printed retroreflective sheet of the present invention will be described in more detail with reference to the figures.

[0018]

A retroreflective sheet that is used for the Invention is preferred to be a triangular pyramidal cube-corner retroreflective sheet or vapor deposition-type triangular pyramidal cube-corner retroreflective sheet consisting of at least a reflective element layer, which consists of many reflective elements and a holder layer, and a surface protective layer, which is provided on the reflective element layer. If it is the retroreflective sheet, it has particularly excellent retroreflective performance, and even if it is provided with a printing layer, sufficient retroreflective performance can be obtained.

[0019]

For the reflective element layer that is used for the present invention and consists

of reflective elements and a holder layer, the reflective element layer, which is publicly-known as a reflective element layer of a triangular pyramidal cube-corner retroreflective sheet or a vapor deposition-type triangular pyramidal cube-corner retroreflective sheet, can be used.

[0020]

An example of a triangular pyramidal cube-corner retroreflective sheet of the present invention is explained in reference to a cross-section view.

[0021]

(4) is a reflective element layer of the present invention, where triangular pyramidal reflective elements are arranged in the closest packing state; (3) is a holder layer for holding the reflective elements; and (11) is the incident direction of light. A reflective element layer (4) and a holder layer (3) are usually integrated (5); however, separate layers can be laminated. Based on the objective and environment for the use of the retroreflective sheet in the present invention, a surface protective layer (1), a printing layer for coloring to adjust hue (2), a bonding agent layer (7) for achieving the sealing structure to prevent water from entering into the back surface of the reflective element layer (4), a holding layer (8) for supporting the bonding agent layer (7), and an adhesive agent layer (9) and a separating material layer (10) that are used to attach the retroreflective sheet to another structure can be provided.

[0022]

The printing layer (2) can usually be provided between the surface protective layer (1) and the holder layer (3), on the surface protective layer (1) or on the reflective surface of the reflective element layer (4), or on the surface protective layer. If the surface protective layer (1) has two or more layers, the printing layer (2) can be provided between the surface protective layers.

[0023]

The printing layer (2) can be regularly provided by gravure printing, screen printing, ink jet printing, and other means.

[0024]

The materials constituting the aforementioned reflective element layer (4) and the holder layer (3) are not particularly specified as long as the materials satisfy flexibility, which is one of the objectives of the present invention; however, the materials with optical transparency and uniformity are preferred.

[0025]

As examples of materials that can be used for the reflective element layer (4) in the present invention are the following: polycarbonate resin, vinyl chloride resin,

(meth)acrylic resin, epoxy resin, styrene resin, polyester resin, fluorine resin, olefin resin, such as polyethylene resin and a polypropylene resin, etc., cellulose resin, and a urethane resin, and others. In addition, for the purpose of improving the weatherability, ultraviolet absorbers, light stabilizers, antioxidants, and other agents may be used alone or in combination respectively. Further, various organic pigments, inorganic pigments, fluorescent pigments, dyes, fluorescent dyes, and other items may be contained as coloring agents.

[0026]

The same resin as used for reflective element layer (4) can be used for the surface protective layer (1). In particular, vinyl chloride resin and (meth)acrylic resin, which have excellent weatherability, solvent resistance, printing performance, etc., are preferred.

[0027]

For the purpose of improving the weatherability, ultraviolet absorbers, light stabilizers, antioxidants, and agents may be used alone or in combination respectively also for surface protective layer (1). Further, various organic pigments, inorganic pigments, fluorescent pigments, dyes, fluorescent dyes, and other items may be contained as coloring agents.

[0028]

In cases of printing on the surface protective layer (1), in order to have excellent printing properties, it is preferred to adjust the surface tension at 32 dyne/cm or more.

[0029]

The area of the independent printing area of the printing layer (2) of the present invention is 0.15 mm^2 to 30 mm^2, preferably 0.2 mm^2 to 25 mm^2, and more preferably 0.4 mm^2 to 15 mm^2.

[0030]

If the area of the independent printing area is 0.15 mm^2 or more, it is preferable since it has excellent molding properties and the hue can be easily adjusted. If it is 30 mm^2 or less, it is preferable since it does not decrease the interlayer adhesion strength between the two layers sandwiching the printing layer (2) in the surrounding area of the printing area.

[0031]

The thickness of printing layer (2) is not specifically limited; however, it is preferable for it to be 0.5 μm to 10 μm, preferably 1 μm to 5 μm, and more preferably 2 μm to 4 μm.

[0032]

If the thickness of printing layer (2) is 0.5 μm or more, it is preferable since it has excellent molding properties and the hue can be easily adjusted. If it is 10 μm or less, it is preferable since it does not decrease the interlayer adhesion strength between the two layers sandwiching the printing layer (2) in the surrounding area of the printing area.

[0033]

In addition to the resin component and the coloring agent, the ink for printing layer (2) may be blended with various additives, such as plasticizers, defoaming agents, leveling agents, ultraviolet absorbers, light stabilizers, heat stabilizers, crosslinking agents, and other agents, and may be blended with solvents for adjusting the viscosity, etc.

[0034]

The resin component used in the ink is not particularly limited; however, melamine resin, epoxy resin, urethane resin, vinyl resin, polyester resin, alkyd resin, etc. have excellent dispersibility and stability in coloring agents, solubility in solvents, weatherability, printability, film adhesion, etc., and they can be used alone or by copolymerizing two or more of them in combination.

[0035]

In cases where vinyl chloride resin or (meth)acrylic resin is used for the surface protective layer (1), which is the preferred form of the present invention, it is preferred for the resin components used in the ink to be acrylic resin or vinyl resin from among the above, which is to be used alone or by copolymerizing them.

[0036]

The coloring agent that is used in the present invention is not specifically limited; however, it is preferred to be a coloring agent that can brighten the hue and have concealing properties and a light color conforming to the sheet's hue is preferred. For example, there are white organic pigments, white and yellow inorganic pigments, and fluorescent dyes and fluorescent brighteners. In particular, white and yellow inorganic pigments that have better concealing properties are preferred.

[0037]

Examples of the aforementioned organic pigments used in the present invention are fast yellow, disazo yellow, permanent yellow, lionol yellow, chromophthal yellow, and irgazin yellow, etc. and they can be used alone or in combination.

[0038]

Examples of the aforementioned inorganic pigments used in the present invention are titanium oxide, calcium carbonate, barium sulfate, zinc oxide, zinc sulfide, etc. for

the color white, and titan yellow, yellow iron oxide, etc. for yellow. They can be used alone or in combination and can also be used with the aforementioned organic pigments.
[0039]

Generally, the reflective element layer (4) is provided with the air layer (6) at the back surface of a triangular pyramidal cube-corner retroreflective element for the purpose of increasing the critical angle satisfying all the internal reflection conditions. In order to prevent a defect, such as decreases in critical angle due to the entry of moisture under use conditions, the reflective element layer (4) and the holder layer (8) are preferably sealed by the bonding agent layer (7).
[0040]

As a sealing method, a method described in US Patent No. 3,190,178, US Patent No. 4,025,159, and Japanese Unexamined Utility Model Application Publication No. 1975-28669 can be used.
[0041]

Examples of the resin used for the bonding layer (7) are (meth)acrylic resin, polyester resin, alkyd resin, epoxy resin, and other resins. As a bonding method, a publicly-known thermal adhesiveness resin bonding method, thermosetting resin bonding method, ultraviolet curable resin bonding method, electron beam curable resin bonding method, etc. can be used as necessary.
[0042]

The bonding agent layer (7) that is used for the present invention can be coated on the whole area of holder layer (8) and can be provided selectively to the bonding parts with the retroreflective element layer (4) by the printing method.
[0043]

As an example of the material constituting the holder layer (8), resin comprising the retroreflective element layer (4), resin that can form general films, textiles, fabrics, and metal foils or plates, such as stainless or aluminum, etc., can be used alone or in combination respectively.
[0044]

Publicly-known materials can be used for the adhesive agent layer (9) to attach a retroreflective sheet of the present invention to a metallic plate, wood plate, glass plate, plastic plate, etc. and for the separating material layer (10) for said adhesive agent layer (9) as necessary. As an adhesive agent, a pressure-sensitive adhesive, heat-sensitive adhesive, or crosslinking adhesive, etc. can be selected as necessary. As the pressure-sensitive adhesive, a polyacrylic acid ester pressure-sensitive adhesive, silicone resin-based pressure-sensitive adhesive, or rubber-based pressure-sensitive adhesive, etc. that

can be obtained by copolymerizing acrylic acid ester, such as butyl acrylate, 2-ethylhexyl ester acrylate, isooctyl acrylate, nonyl acrylate, with acrylic acid, vinyl acetate, etc., can be used. As the heat-sensitive adhesive, an acrylic resin, polyester resin, or epoxy resin, etc. can be used.

[0045]

Next, an example of the vapor deposition-type triangular pyramidal cube-corner retroreflective sheet of the present invention will be described in reference to a cross-section view.

[0046]

For the surface protective layer (1), the printing layer (2), the holder layer (3), the reflective element layer (4), and the layer (5) integrating (3) and (4), the adhesive agent layer (9), and the separating material layer (10) of the vapor deposition-type triangular pyramidal cube-corner retroreflective sheet, the same materials as the aforementioned triangular pyramidal cube-corner retroreflective sheet can be used.

[0047]

On the element surface of the reflective element layer (4) of a vapor deposition-type triangular pyramidal cube-corner retroreflective sheet, a metallic specular reflection layer (12) is provided and, in addition, the adhesive agent layer (9) comes directly into contact with the specular reflection layer (12) and is laminated. Since the vapor deposition-type triangular pyramidal cube-corner retroreflective sheet in this form retroreflects based on the specular reflection principle, an air layer is not required. Therefore, it does not require the bonding agent layer and the holder layer.

[0048]

The triangular pyramidal cube-corner retroreflective sheet of the present invention can be provided with the specular reflection layer (12), which consists of aluminum, copper, silver, nickel, or other metal, on the surface of the reflective element layer (4) by using vacuum-based deposition, chemical plating, spattering, or other means. From among the methods to provide the specular reflection layer (12), the vacuum-based deposition method using aluminum is preferred since it can reduce deposition temperature and thermal deformation of the retroreflective element (4) in the deposition process can be reduced to a minimum, and the obtained color hue of the specular reflection layer (12) also becomes bright.

[0049]

The aforementioned continuous deposition device of the aluminum specular reflection layer (12) consists of a vacuum container which can maintain the vacuum at approximately 7 to $9*10^{-4}$mmHg, a winding-out device to feed a prism roll sheet that

is placed in the vacuum container and consists of a base sheet and a surface protective layer laminated on the surface at the light incident side of the base sheet, a winding-up device to wind up the vapor-deposited prism roll sheet, and a heater that is provided between these devices and can melt aluminum with an electric heater in a graphite crucible. In the graphite crucible, pure aluminum pellets with a purity of 99.99 wt% or higher, and, for example, under the conditions at AC voltage of 350 V to 360 V, a current of 115 A to 120 A, and processing speed of 30 to 70 m/min., the specular reflection layer (12) can be vapor-deposited, for example, at a thickness of 800 to 2,000 angstroms on the surface of a retroreflective element with melted and vaporized aluminum atoms.

[Working examples]

[0050]

Hereinafter, the details of the present invention will be described more specifically. It goes without saying that the present invention is not limited to the working examples.

[0051]

The numerical values stated in the working examples, the Description, and the claims are measured by the following methods.

[0052]

(1) Retroreflective performance

As the retroreflective performance measuring device, "Model 920" manufactured by Advanced Retro Technology Co., Ltd. is used, and the retroreflective performance of a retroreflective sheet of 100mm*100mm is measured at 5 points under the conditions of an observation angle of 0.2 degrees and incident angle of 5 degrees according to JIS Z-9117. The mean value is used for the retroreflective performance of the retroreflective sheet.

[0053]

(2) Hue (brightness)

As a hue measuring device, "SE-2000" manufactured by Nippon Denshoku Industries Co., Ltd. is used, and the hue of a 50 mm-diameter circular retroreflective sheet is measured at 5 points according to JIS Z-9117. The results are expressed in XYZ color system. The mean value of Y values is used as the hue (brightness) of the retroreflective sheet.

[0054]

(3) W-O-M weatherability

A weatherability test was performed using CXW-B-812501500 manufactured by Atlas Electric Device Company as a weatherability tester according to JIS Z-9117 except for setting the exposure time at 3,000 hours.

[0055]

The above results are summarized in Table 1.

[0056]

Working Example 1

[0057]

<Preparation of a mold>

On a 100 mm square brass plate, the surface of which has been ground flat, the first direction and the second direction are cut by the fly cutting method with a repetitive pattern of parallel grooves having a V-shaped cross-section, using a diamond-bit for which the edge angle is 68.53 degrees so that the repetitive pitch in the first direction and second direction is 210.88 μm, groove depth is 100 μm, and intersection angle of the first direction and the second direction is 58.76 degrees.

[0058]

Subsequently, the third direction is cut as V-shaped parallel grooves by using a diamond-bit with the edge angle of 71.52 degrees so that the repetitive pitch is 214.92 μm, groove depth is 100 μm, and the intersection angle between the first direction, the second direction, and the third direction is 60.62 degrees. Then, a master block wherein many convex triangular pyramidal cube-corners with the height of 100 μm are provided on a brass plate in the closest packing state, is formed. The optic axis inclined angle of the triangular pyramidal reflective element is + 1 degree. All face angles of three-sided prism that consists of a triangular pyramid are 90 degrees.

[0059]

A concave cube-corner mold, of which the material is nickel, the thickness is 1.0 mm, and the figure is reversed, was created using the brass master block by the electroforming method.

[0060]

<Preparation of printing ink>

The following ink composition is stirred and mixed in a bead mill for 5 hours to prepare white ink with solid content of 19%. The binder that is used for the preparation is prepared by combining butyl acrylate, acrylic acid, and vinyl acetate with 99 wt.%, 99 wt.%, and 99 wt.%, respectively; a solvent is prepared as mixed solvent of toluene and ethyl acetate at a ratio of 1:1; and an initiator is prepared by polymerizing benzoyl peroxide so that the number average molecular weight is 990,000 and dry solid content is 50 wt.%.

[0061]

Ink binder: 100 wt.%

Epoxidized soybean oil: 0.5 wt.%
Titanium oxide: 1.5 wt.%
Precipitated barium sulfate: 1 wt.%
Defoaming agent: 0.1 wt.%
Methyl ethyl ketone: 80 wt.%
Toluene: 50 wt.%
Ethyl acetate: 45 wt.%

[0062]

<Preparation of printing film>

The gravure printing is provided using the aforementioned printing ink in the staggered form with 2 mm-diameter circular printing pattern at 4 mm pitch as shown in FIG. 4 on an acrylic resin film with a thickness of 70 μm ("Sunduren LHB" manufactured by Mitsubishi Rayon Co. Ltd.). The printing thickness in this case was approximately 2 μm.

[0063]

Further, a printed laminate sheet is obtained by facing the printing surface of the printing acrylic film inside and providing thermocompression to a polycarbonate resin sheet with a thickness of 200 μm ("Iupilon H-3000" manufactured by Mitsubishi Engineering-Plastics Corporation) using a pair of laminate rolls under conditions of temperate at 200 °C and welding pressure of 30 Kg/m.

[0064]

<Preparation of printed reflective sheet>

An in-process product (hereinafter simply referred to as "in-process product"; it is not shown in the figure) of the printed triangular pyramidal cube-corner retroreflective sheet is prepared using the aforementioned mold as follows: after providing compression molding to the aforementioned printed laminate sheet under the conditions of a molding temperature of 200 °C and molding pressure of 50 Kg/m, it is cooled down to 30 °C under the increased pressure; the resin sheet is taken out, and the cube-corners with a thickness of the holder layer of approximately 170 μm are arranged in the closest packing state on the surface.

[0065]

In addition, the in-process product was formed as a sealed structure using a thermoplastic polyester resin sheet that is laminated at a thickness of 38 μm on a white polyethylene terephthalate film with a thickness of 50 μm and using a convex honeycomb-shaped sealing mold.

[0066]

Further, a printed triangular pyramidal cube-corner retroreflective sheet as shown in FIG. 1 is created by laminating acrylic pressure-sensitive adhesive with a thickness of 60 μm (Nissetsu KP1818 manufactured by Nippon Carbide Industries Co., Inc.) and a polypropylene separating sheet with a thickness of 100 μm (manufactured by Okura Industrial Co., Ltd.).

[0067]

Working Example 2

[0068]

The in-process product prepared in Working Example 1 is placed in a vacuum-based deposition device consisting of a heater that can melt aluminum with an electric heater in a graphite crucible that is placed in a vacuum container, which can maintain a vacuum at $9*10^{-4}$ mmHg. After pure aluminum pellets with a purity of 99.99 wt.% or higher and granular metallic titanium are charged at a weight ratio of 100:1 into a graphite crucible, aluminum atoms are vacuum-deposited and vapored under the conditions of AC voltage of 3,500 V, a current of 115 A to 120 A, and a batch processing time of 5 minutes. The vapored aluminum atom provides vapor-deposition to three inclined surfaces of cube-corner reflective elements as a specular reflection layer. The thickness of the aluminum vapor-deposited film in this case is 1,100 angstroms.

[0069]

A printed vapor-deposited triangular pyramidal cube-corner retroreflective sheet is created by laminating an adhesive layer and a separating sheet in the same way as Working Example 1 on the vapor-deposited surface of the vapor-deposited prism roll sheet.

[0070]

Working Example 3

[0071]

A laminated sheet is obtained by providing thermocompression to an acrylic resin film with a thickness of 70 μm ("Sunduren LHB" manufactured by Mitsubishi Rayon Co. Ltd.) and a polycarbonate resin sheet with a thickness of 200 μm ("Iupilon H-3000" manufactured by Mitsubishi Engineering-Plastics Corporation) using a pair of laminate rolls under conditions of temperature at 200 °C and a welding pressure of 30 Kg/m.

[0072]

Using the aforementioned printing ink prepared in Working Example 1, gravure printing was provided on a polycarbonate surface in a staggered form with 1 mm-diameter circular printing pattern at 3 mm pitch as shown in FIG. 4 . The printing thickness in this case was approximately 2 μm.

[0073]

A compression-mold is provided to this printed laminate sheet under the same conditions as Working Example 1, so that the printing surface of the sheet comes into contact with the mold.

[0074]

Further, a vapor deposition-type triangular pyramidal cube-corner retroreflective sheet is created by the same method as Working Example 1 by providing a sealing structure and an adhesive layer and providing white printing to part of the prism reflective surface.

[0075]

Comparative Example 1

[0076]

A triangular pyramidal cube-corner retroreflective sheet is prepared by printing in the same way as Working Example 1 except for using the pattern shown in FIG. 6 as a printing pattern.

[0077]

Comparative Example 2

[0078]

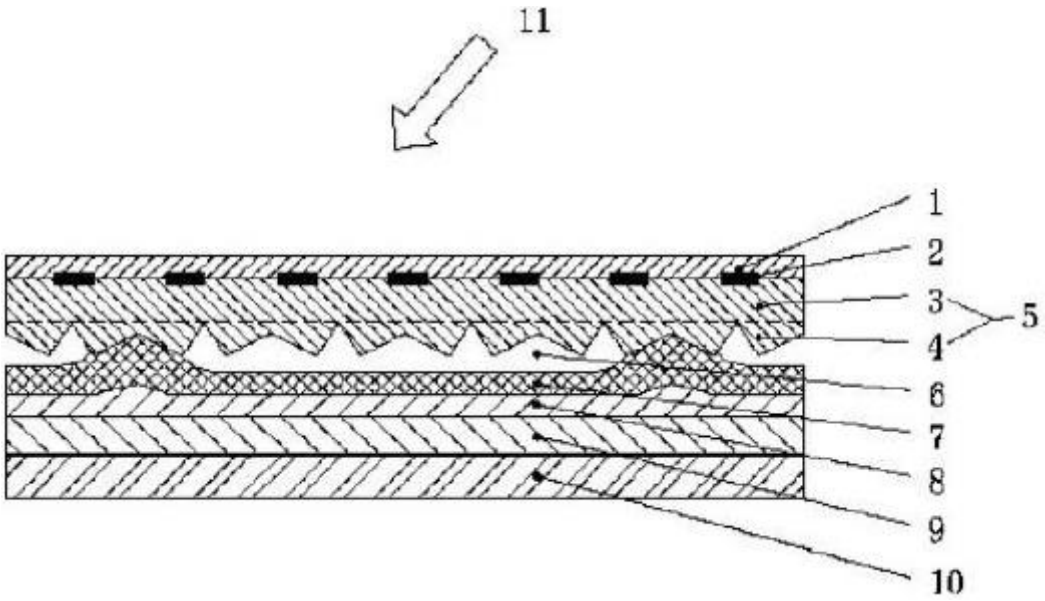
A triangular pyramidal cube corner retroreflective sheet is prepared by printing in the same way as Working Example 2 except for using a pattern shown in FIG. 6 as a printing pattern.

[0079]

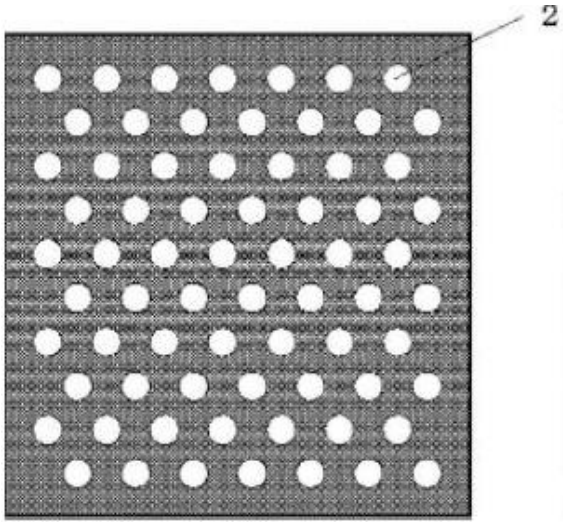
[Table 1]

	Working Example 1	Working Example 2	Working Example 3	Comparative Example 1	Comparative Example 2
Retroreflective properties	430	615	512	457	534
Y value	46	28	25	48	28
Appearance after the weatherability test	No abnormality	No abnormality	No abnormality	Blister in the printed part	Blister in the printed part

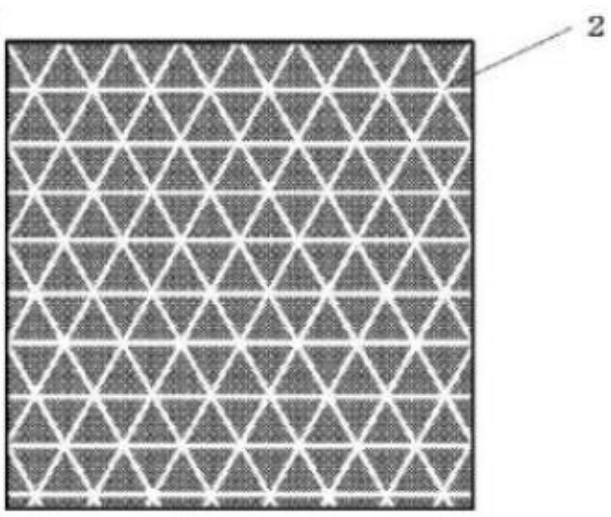
[FIG. 1]



[FIG. 4]



[FIG. 6]



(Attachment 2)

1. Line 3 through line 8, page 1

"Retro-reflective material

This invention relates to retro-reflective material and more particularly, but not exclusively, retro-reflective material for traffic hazard indicators such as cones and bollards and for road signs and the like."

(Translation)

「再帰反射材

本発明は、再帰反射材及び、より特定して、しかし他を排斥するのではなく、コーンや車止めポールのような交通危険標識や、道路標識やその類のための再帰反射材に関するものである。」

2. Line 9 through line 31, page 1

"It is general practice to impart retro-reflective properties to traffic hazard indicators such as road cones and bollards by placing an appropriate shaped retro-reflective sleeve over the cone or bollard. To meet present requirements the sleeve must at night reflect incident light, for example from the headlights of vehicles, and in daylight the sleeve must appear white. To achieve this the usual construction of sleeve material comprises a backing, for example of plastics which is coated with a reflective material. Such as aluminum paint. A layer of adhesive containing a white pigment is applied over the reflective coating and glass microspheres or beads are partially embedded in the adhesive.

Recently it has been proposed that the retro-reflectivity of such sleeves should be increased. It is the case that the white pigment in the adhesive in the above described assembly reduces the retro-reflectivity. Retro-reflectivity can be improved if the amount of white pigment in the adhesive is reduced but the consequence of that modification is that the material no longer has a sufficiently white appearance in daylight."

(Translation)

「一般的な慣行として、道路コーンや車止めポールを覆う適切な形状の再帰反射スリーブを装着することで、道路コーンや車止めポールなどの交通危険標識に再帰反射特性が与えられている。現在の必要条件に適合するためには、スリーブは、夜間には例えば自動車のヘッドライトからの入射光を反射しなければならず、日光の下ではスリーブが白く見えなければならない。これを実現するために、スリーブ材の通常の構造は、例えば、アルミニウム塗料のような反射性材料でコーティングされたプラスチックの裏材を有している。白色顔料を含む接着剤層は、反射コーティングの上に塗布され、ガラスの微小球又は球は、接着剤に部分的に埋め込まれている。最近では、そのようなスリーブの再帰反

射性を増加させるべきことが提案されている。上記の組立体の接着剤中の白色顔料が、再帰反射性を低下させることは事実である。もし、接着剤中の白色顔料の量が減らされると、再帰反射性を向上させることができるが、その変更の結果、その材料は、日光の下で十分に白い外観 を持たなくなる。」

3. Line 34 through line 47, page 1

"According to the invention there is provided a retro-reflective material comprising a backing, a retro-reflective coating on said backing, glass microspheres attached to said retro-reflective coating, wherein said coating is or appears incomplete and white colour being provided in the part or parts where the coating is or appears to be absent. With the invention, therefore, white pigmented material is not applied uniformly over the retro-reflective coating but is provided over parts only of the coating. These parts may be discrete or interconnected areas such as spots or lines or other shapes and they may be regularly or irregularly distributed over the assembly."

(Translation)

「本発明により、裏材、前記裏材上の再帰反射コーティング、前記再帰反射コーティングに取り付けられたガラス微小球を有する再帰反射材が提供され、ここで、前記コーティングは不完全であるか、又は不完全であるように見えてもよく、コーティングが欠けているか、又は欠けているように見える部分あるいは複数の部分には白色が付与されている。

したがって、本発明では、白色に着色された材料は、再帰反射コーティングの上に均一に塗布されるのではなく、コーティングの複数の部分の上にのみに付与される。これらの複数の部分は、複数の点、複数の線、あるいはその他の形状のような分離した複数の領域又は相互に連結した複数の領域であってもよく、それらは、組立品の上に規則的に又は不規則的に分布してよい。」

4. Line 48 through line 53, page 1

"There are various ways in which the white colour can be incorporated in the material of the invention. For example the white colour can be printed on one or both sides of a transparent or translucent cover sheet which extends over the retro-reflective coating."

(Translation)

「本発明の材料に白色を組み込むことができる様々な方法がある。例えば、白色は、再帰反射コーティングを覆う透明又は半透明のカバーシートの片面又は両面に印刷され得る。」

5. Line 60 through line 66, page 1

"The glass microspheres should be attached to the retro-reflective coating so that they do not penetrate completely therethrough. To ensure that that does not happen the

retro-reflective coating can be formed in two layers, the secondlayer being applied after the first layer has dried and the microspheres beingattached to the second layer."

(Translation)

「ガラス微小球は、再帰反射コーティングを完全に貫通することがないように、再帰反射コーティングに取り付けられなければならない。そのようなことが起こらないようにするため、再帰反射コーティングが２層で形成され、第１の層が乾燥した後に第２の層が塗布され、ガラス微小球が第２の層に取り付けられる。」

6. Line 74 through line 83, page 1

"Referring to the drawing the retro-reflective material comprises a backing 10 which may be flexible or rigid and is preferably of plastics such as polyvinyl chloride. A layer 12 of retro-reflective material is applied to one side of the backing. The coating may be formed from any suitable retro-reflective 15 material such as aluminium paint which can be sprayed, coated or otherwise applied onto the backing. A second layer 14 of retro-reflective material is applied over the first layer 12."

(Translation)

「図面を参照すると、再帰反射材は、柔軟性又は剛性があり、好ましくはポリ塩化ビニルなどのプラスチック製の裏材１０を有する。

裏材の片面には、再帰反射材料の層１２が塗布されている。コーティングは、裏材にスプレー、コーティング、又はその他の方法で塗布することができるアルミニウム塗料など、任意の適切な再帰反射材料から形成してもよい。第１の層１２の上には、再帰反射材料の第２の層１４が塗布されている。」

7. Line 88 through line 94, page 1

"Glass microspheres 16 of the kind commonly used in retro-reflective assemblies are attached to the second layer 14. Preferably the second layer is formed from a liquid, and while the layer is still liquid the glass microspheres are partially embedded therein. When the second layer dries the glass microspheres are firmly secured to the second layer."

(Translation)

「再帰反射組立体で一般的に使用される種類の複数のガラス微小球１６が、第２の層１４に取り付けられる。好ましくは、第２の層は液体から形成され、この層がまだ液体であるうちに、ガラス微小球がその中に部分的に埋め込まれる。第２の層が乾燥すると、ガラス微小球は第２の層にしっかりと固定される。」

8. Line 95 through line 98, page 1

"A two layer construction of retro-reflective coating is not essential. A single layer can be used provided that the microspheres do not penetrate through 15 the layer."

(Translation)

「再帰反射コーティングの２層構造は必須ではない。微小球に層を貫通させないことを条件として、単一層を使用することができる。」

9. Line 99 through line 114, page 1

"A transparent or translucent cover layer 18 is disposed over the second layer 16. Preferably the cover layer 18 is not attached or secured to the rest of the assembly except adjacent to the edges of the piece of material. Part of the cover layer is coloured white. The white colouration can be provided on one or both sides of the cover layer. Alternatively the white colour can be applied directly onto the retro-reflective coating 14 before the microspheres are attached thereto or the retro-reflective coating can be discontinuous to expose the backing. The backing can itself be coloured white or white colour can be applied to the exposed parts of the backing. The white coloured part can be in a random or uniform pattern, for example in the form of dots, lines or other regular or irregular shapes."

(Translation)

「透明又は半透明のカバー層１８が、第２の層１４の上に設けられている。好ましくは、カバー層１８は、材料片の端部に隣接する部分を除いて、組立体の残りの部分に取り付けられず、又は固定されていない。カバー層の一部は白色に着色されている。白色の着色は、カバー層の片面又は両面に付与することができる。代わりに、微小球をそこに取り付ける前に、再帰反射コーティング１４の上に白色が直接塗布されてもよく、又は、再帰反射コーティングが、裏材を露出するように、不連続とされてもよい。裏材自体が白色に着色されてもよく、又は、白色が裏材の露出部分に塗布されてもよい。白色に着色された部分は、例えば、複数の点、複数の線、又は他の規則的又は不規則な形状による、ランダム又は均一なパターンであり得る。」

10. Line 115 through line 123, page 1

"In order that assembly should have the requisite reflectivity the white20 colour must not obscure or attenuate more than a limited amount of the retroreflectivity of the retro-reflective coating. However, sufficient white colour mustbe present such that the material appears white in daylight. Generallysatisfactory assemblies are obtained with from 10 to 20%, preferably from 12 to17%, of the area of the material coloured white."

(Translation)

「組立体に必要な反射性を持たせるためには、白色が再帰反射コーティングの再帰反射性を一定限度以上に不明瞭にしたり、減衰させたりしてはならない。しかしながら、材料が日光の下で白色に見えるように、十分な白色が存在しなければならない。一般に、満足な組立体は、材料の面積の１０～２０％、好ま

しくは１２～１７％が白色に着色されたもので得られる。」

11. Line 128, page 1 through line 15, page 2

"CLAIMS

1. A retro-reflective material comprising a backing a retro-reflective coating on said backing, glass microspheres attached to the said retro-reflective coating, wherein said coating is or appears incomplete there being white colour provided in the part or parts where the coating is or appears to be absent.

2.A retro-reflective material as claimed in Claim1, wherein the white colour is provided over the retro-reflective coating.

3. A retro-reflective material as claimed in Claim1 or Claim2 wherein the white colour is applied directly onto the retro-reflective coating.

4. A retro-reflective material as claimed in Claim1 or Claim2, wherein the white colour is provided on a cover sheet which extends over the retro-reflective coating."

(Translation)

「特許請求の範囲

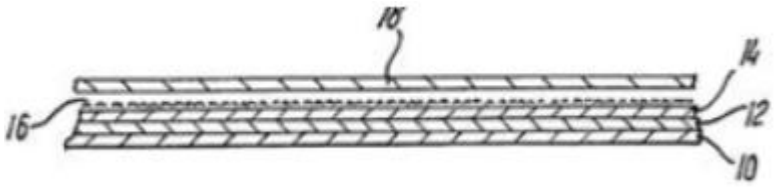
１．裏材、前記裏材上の再帰反射コーティング、前記再帰反射コーティングに取り付けられたガラス微小球を含む再帰反射材であって、前記コーティングが不完全であるか、又は不完全であるように見え、前記コーティングが欠けているか又は、欠けているように見える、部分又は複数の部分に白色が付与されている、再帰反射材。

２．白色が再帰反射コーティングの上に付与されている、請求項１に記載の再帰反射材。

３．白色が再帰反射コーティングの上に直接塗布されている、請求項１又は２に記載の再帰反射材。

４.白色が再帰反射コーティングの上に広がるカバーシートに付与されている、請求項１又は２に記載の再帰反射材。」

12. Figure



(Attachment 3)

1. Line 4 through line 9, page 1

"Light reflector plate and manufacturing method thereof

The present invention is related to a retroflector plate and its manufacturing method.

A reflective traffic sign consisting of a metallic sheet coated with reflective film to increase traffic safety at night is well known."

2. Line 13, page 1 through line 7, page 2

"Preferably, if a reflector plate is provided to vehicles, vehicles can be recognized from a distance even in traffic at night. In particular, preferably, if a number plate of a vehicle is reflected, the vehicle can be identified by its number plate even at night when the vehicle is illuminated. A number plate that has been considered to be publicly-known is a non-reflective aluminum sheet coated with lacquer. In cases of using said number plate, letters and/or numbers are embossed convexly, and then the convex surface is usually coated with black lacquer."

3. Line 8 through line 12, page 2

"The problem of the present invention is to provide a retroreflective surface and plate in order to increase traffic safety at night and increase the visibility of traffic routes and traffic control devices, along with the visibility of vehicles."

4. Line 12 through line 14, page 2

"In addition, the problem of the present invention is to provide a method to manufacture said reflector surface and plate."

5. Line 15, page 2 through line 3, page 3

"A retroreflective surface and plate based on the present invention consist of a reflector plate and are characterized by the following: the reflector plate has a plastic plate; wherein its visible surface is smooth; for which the back surface has a triangular prism or equivalent reflective element formed by the optical accuracy and consists, for example, of silver, aluminum, copper, chrome, nickel, etc. and is covered with a reflective layer provided with reflective coating; and on the visible surface of the reflector plate, letters and/or numbers, or other codes are engraved, embossed, or attached.

The triangular prism forms an upside-down triangular pyramid. However, other prism systems can also be used for light reflection."

6. Line 4 through line 7, page 3

"As a result of developing the concept of the present invention in particular, the reflector plate of the present invention is used as a number plate of a vehicle. In this case, the codes are in a color different from that of the reflector plate in which codes

are not included."

7. Line 8 through line 21, page 3

"According to the intrinsic characteristics of the present invention, codes are embossed convexly on the visible surface of the reflector plate. In cases of a reflective number plate manufactured by this method, the reflective plate of the present invention is embossed in the same method as publicly-known aluminum plates. The embossed codes become prominent from the reflector's surface and are then usually coated with black lacquer. Therefore, manufacturers of publicly-known number plates do not require a new embossing device and are not required to change the embossing method of number plates and the subsequent processes. In cases of a reflector plate of the present invention, and if, for example, it is necessary to provide lacquer coating to or bonding to the codes, the plate manufacturers are required to establish a new operation process."

8. Line 22, page 3 through line 5, page 4

"In cases where a reflector plate of the present invention is embossed, a triangular prism that is provided at the back of convex codes is crushed, and therefore, convex codes no longer reflect. In cases of a number plate, convex codes on the surface are colored and coated by lacquer, and this point does not become a problem from the perspective of the reflection rate."

9. Line 6 through line 24, page 4

"In cases of a number plate, when embossing codes on the reflector plate with the present invention, the triangular prism will be crushed. This is a significant advantage over existing number plates. In cases of a conventional number plate, the prominent part of a lacquer-coated aluminum sheet is returned to the original position by hitting or pushing out appropriately, and therefore, it does not leave a definitive trace. On the other hand, this does not apply to a reflector with the present invention. This is because even if the prominent part is pushed back, the crushed triangular prism at the back of the codes remains crushed. When the reflector plate with the present invention is formed as a number plate, it is impossible to make changes to the embossed codes without leaving a definitive trace. It means that there is no possibility of fabrication at all. Even if embossed codes are pushed back to flat again, since this part does not reflect a prism, the position and outline of the codes can always be confirmed. If another code is embossed at the same point, since said other code does not match the previous code completely, fabrication of the number plate can be identified."

10. Line 1 through line 5, page 5

"The embossing of codes on a reflector plate with the present invention can be

performed not by crushing the prism provided at the back of the codes, but by crushing other prisms of the reflector plate. In this case, codes alone reflect."

11. Line 6 through line 16, page 5

"According to the present invention, codes can also be engraved in a concave shape on the visible surface of the reflector plate and the visible surface around the codes can become prominent by engraving. According to another characteristic feature of the present invention, it is possible to emboss or engrave the outline of codes alone on the visible surface. In this solution, since prisms located in the outline area of codes alone are crushed by embossing, the outline of the codes does not reflect; however, most of the prisms located at the back of the codes remain without change. Therefore, the codes reflect."

12. Line 1 through line 22, page 7

"In an example of vehicle number plates, in order to show the visible surface that is not embossed in white and opaque in daylight, many white dots in the form of the 'Raster' can be printed on the visible surface of the reflector plate. A 'Raster' is created so that reflected light is transmitted at the predetermined percentage. When a 'Raster' is created in an opaque and light impermeable color, reflected light passes the gaps of the 'Raster,' and therefore, it does not absorb the color of the 'Raster.' Coloration of the reflector plate and the color of the 'Raster' are made so that the color of the visible surface conforms to the 'Raster' in daylight, in other words, the color looks as though it conforms to the 'Raster.' On the other hand, the color of the reflector plate can be selected so that it looks as though it conforms to the coloration of the plastic at night. For example, the reflector plate can be manufactured so that it looks black in daylight and it looks white at night.

Based on another characteristic feature of the present invention, in order to distinguish codes and the visible surface of the reflector plate that does not include the codes by color, one side of the surface can be coated with transparent lacquer which makes the reflected light look in a corresponding color."

13. Line 1 through line 11, page 9

All surfaces of a reflector plate can be provided with a lacquer coloring layer. When embossing the reflector plate, embossed convex codes can be polished using a simple method. Therefore, the coloring layer of the convex codes is removed, while the coloring layer of non-convex reflector plates remains without any change. The coloring layer consists of lacquer, foil, plastic, and various other materials and the layer can be coated by an injection molding method or can be inserted in the injection mold of the reflector as a plastic plate."

14. Line 12 through line 27, page 9

"In order to create a contrast of color between the embossed reflective surface and non-embossed reflective surface, a coloring sheet or code can be manufactured by using the same or similar (transparent or opaque) plastic by the injection molding method, or by punching a flat plate (foil, etc.) and inserting it into an injection mold, and, in addition, they can subsequently be attached to the reflector. They can also be manufactured by inserting the reflector into a mold of coloring codes into which plastic is injected. All transparent or opaque colored lacquer coating on the visible surface of a reflector plate that is stated can be replaced with printed transparent foil. The foil is bonded with plastic materials of the reflector surface by bonding on the visible surface of the reflector or by, for example, inserting into a mold when implementing injection molding of the reflector."

15. Line 6 through line 8, page 11

"FIG. 12: A reflector plate in FIG.11; Figure of additional process after embossing the visible surface of the reflector"

16. Line 1 through line 10, page 12

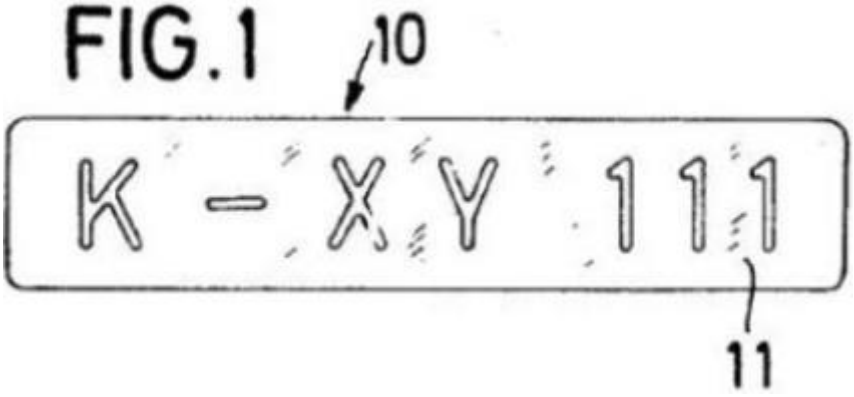
"FIG. 1 shows the vehicle plastic number plate 10. The materials of the plate 10 are light transmissive. The back surface of plate 10 has a triangular prism that is formed based on optical accuracy and is coated with a metallic layer. When the visible surface 11 of the plate 10 is illuminated at night, it reflects light. Therefore, a vehicle equipped with the plate 10 can be confirmed on the traffic routes at night at a distance. Letters, numbers, and other codes are prominent in a convex form on the visible surface 11 of the plate 10."

17. Line 16, page 14 through line 2, page 15

"According to FIG. 11, the coloring layer 35 consisting of lacquer, membrane, and plastic was provided on the entirety of the visible surface 34 of the reflector plate during or after the casting or injection molding process. The coated plate is embossed, like reflector plate 14 in FIG. 3 and FIG. 4. Subsequently, the embossed front surface of the code 36 of the layer 35 is polished by the rotary disc 37 and, in accordance with this process, the reflector plate 34 thus coated can be transferred in the direction of the arrow 38. Then, the coloring layer of the convex code 36 is eliminated, and, on the other hand, the coloring layer of the non-convex surface is maintained."

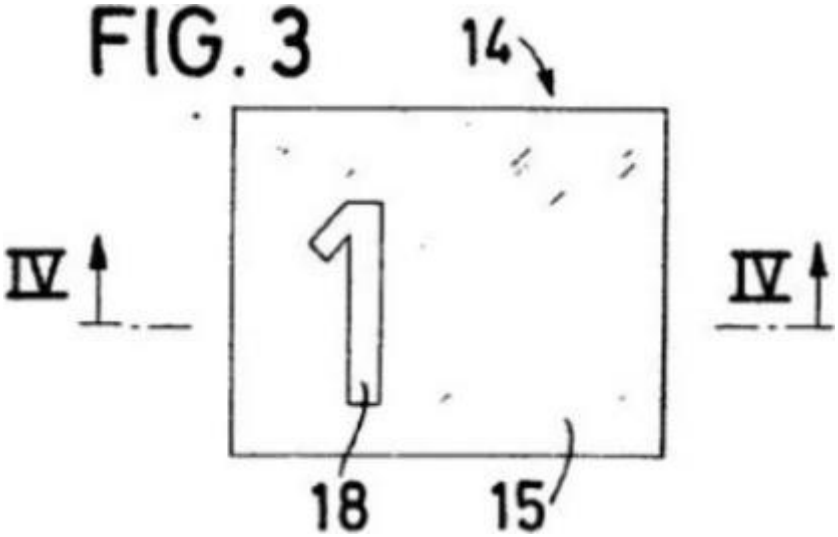
18. FIG. 1

FIG. 1

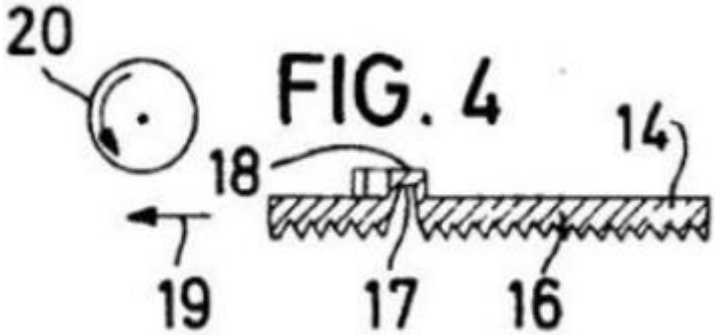


19. FIG. 3

FIG. 3



20. FIG. 4



21. FIG. 11 and FIG. 12

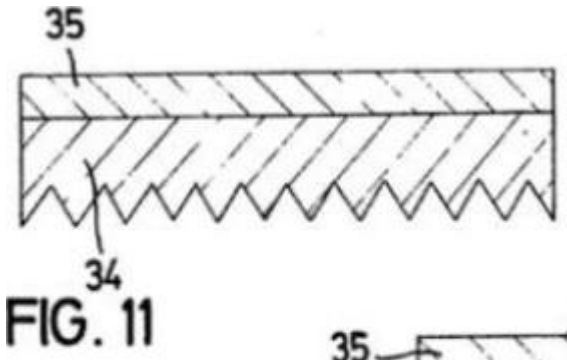


FIG. 11

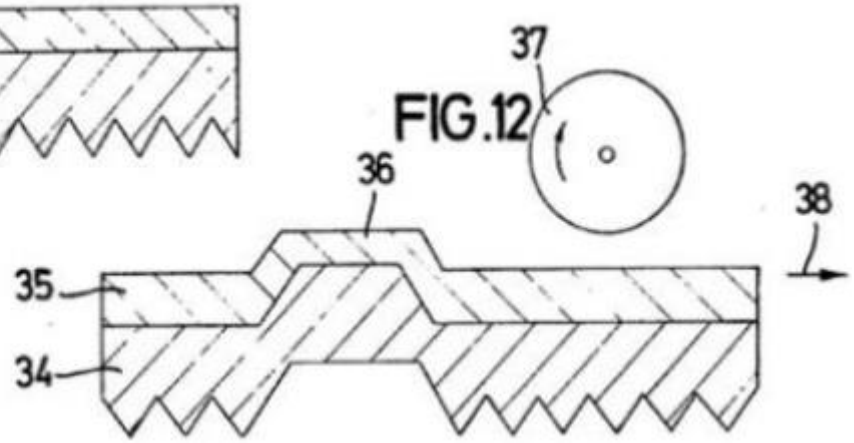


FIG. 12

(Attachment 4)
[Detailed explanation of the invention]
[0001]
[Industrial applicability] The present invention relates to a triangular pyramidal cube-corner retroreflective sheet having a novel structure. More particularly, the present invention relates to a triangular pyramidal cube-corner retroreflective sheet on which triangular pyramidal reflective elements having a novel structure are arranged in the closest packing state.
[0002] Particularly, the present invention is related to a triangular pyramidal cube-corner retroreflective sheet that is comprised of a triangular pyramidal cube-corner retroreflective element (hereinafter simply referred to as a "triangular pyramidal reflective element" or simply "element" in some cases) that is useful for signs, such as road signs, construction signs, etc.; number plates for vehicles, such as automobiles and motorcycles, etc.; safety materials for clothing and life-saving devices, etc.; and reflector plates, etc. of markings for commercial signs, etc., visible lights, laser beams, or infrared reflection type sensors.
...
[0006]
[Prior art] A retroreflective sheet that reflects incident light towards the light source is well known. Said sheets using the retroreflective properties are widely used in the aforementioned areas. In particular, a retroreflective sheet that uses the retroreflection principle of cube-corner retroreflective elements, such as triangular pyramidal reflective elements, etc. has a dramatically excellent light retroreflective efficiency compared to conventional retroreflective sheets that use micro glass spheres. Thanks to the excellent retroreflective performances, the use of retroreflective sheets is expanding year by year.
[0007] However, conventional publicly-known triangular pyramidal retroreflective elements show good retroreflective efficiency within a range where the angle between the optic axis of elements (the axis that passes through the vertex of the triangular pyramid at an equivalent distance from three inclined surfaces (surface a, surface b, surface c) that consist of triangular pyramidal cube-corner retroreflective elements and intersect each other at a 90-degree angle) and the incident light (hereinafter, the angle is referred to as the "incident angle") is small based on the reflection principle; however, as the incident angle increases, the retroreflective efficiency rapidly decreases (in other words, the incident angle property decreases).
...

[0012] On the other hand, triangular pyramidal retroreflective elements can reflect the light in the incident direction of light over nearly the entire surface of the elements. Therefore, reflected light does not reflect by diffusing in a wide angle due to spherical aberration, like micro glass sphere-type retroreflective elements, etc. However, in practice, for example, when the light from a vehicle head lamp is retroreflected by a traffic sign, the narrow diffusion angle of the retroreflected light may easily cause an inconvenience, such as being difficult to reach a person who is in a distant position from the optical axis, for example, the eyes of a vehicle driver. In particular, when the distance between a vehicle and a traffic sign is reduced, the angle (observation angle) between the light incident axis and the axis connecting the vehicle driver and the reflecting point (observation axis) increases, and therefore, said inconvenience increases (in other words, the observation angle property becomes inferior).

...

[0024]

[Problems to be solved by the invention] As a basic optical property generally desired of a triangular pyramidal cube-corner retroreflective sheet, the wide-angle property is required in addition to high luminance, that is, the level of reflection luminance that is represented by the reflection luminance of the incident light from the front of the sheet. Moreover, concerning the wide-angle property, three performance properties, including observation angle property, incident angle property, and rotation angle property, are required.

[0025] As stated above, all conventional publicly-known retroreflective sheets comprised of triangular pyramidal cube-corner retroreflective elements had less incident angle property and their observation angle property was not generally satisfactory. The present inventor found, based on light-trace simulation, that by setting the height (h') from the flat surface (X-X') including the many bases (x, x, ...) shared by the triangular pyramidal retroreflective elements provided at symmetrical positions from each other to the vertexes of the elements (H1, H2), substantially larger than the height (h) from the surface (Z-Z') containing the base (z, w) of two surfaces (surface a, surface b) that substantially intersect at the right angle with surface c, which has one of the aforementioned shared bases of the triangular pyramidal reflective elements as one of its side, the incident angle property of a retroreflective sheet comprised of said triangular pyramidal reflective elements can be improved; and the present inventor filed a patent. (Patent Application No. 1996-295907) ...

...

[0136] Next, a triangular pyramidal cube-corner retroreflective sheet with negative

inclination, which is the preferred structure of the triangular pyramidal cube-corner retroreflective sheet in the present invention, is explained by referring to FIG. 14, which is a cross-section view thereof.

[0137] In FIG. 13, (1) is a reflective element layer wherein triangular pyramidal reflective elements (R1, R2) of the present invention are arranged in the closest packing state; (2) is a holder layer for holding the reflective elements; and (10) is the incident direction of light. The reflective element layer (1) and the holder layer (2) are usually integrated; however, they can be laminated as separate layers. Based on the objective and environment for the use of the retroreflective sheet in the present invention, the surface protective layer (4), the printing layer (5) for communicating information to the observer or coloring the sheet, the bonding material layer (6) for achieving the sealing structure to prevent water from entering into the back surface of the reflective element layer, the air layer (3) surrounded by the reflective element layer (1) and the bonding material layer (6) for guaranteeing retroreflection at the interface of the reflective element, the holder layer (7) for supporting the bonding material layer (6), and the adhesive agent layer (8) and the separating material layer (9) that are used to attach the retroreflective sheet to another structure can be provided.

[0138] The same resin as used for the retroreflective element layer (1) can be used for the surface protective layer (4). However, for the purpose of improving the weatherability, ultraviolet absorbers, light stabilizers, antioxidants, and other agents can be used alone or in combination respectively. Further, various organic pigments, inorganic pigments, dyes, and other items may be contained as coloring agents.

[0139] The printing layer (5) can usually be provided between the surface protective layer (4) and the holder layer (2), on the surface protective layer (4), or on the reflective surface of reflective element (1) and can be provided usually by means of gravure printing, screen printing, and ink jet printing, etc.

[0140] The materials constituting the aforementioned reflective element layer (1) and the holder layer (2) are not particularly limited as long as the materials satisfy flexibility, which is one of the objectives of the present invention; however, the materials with optical transparency and uniformity are preferred. As examples of materials that can be used in the present invention are the following: polycarbonate resin, vinyl chloride resin, (meth)acrylic resin, epoxy resin, styrene resin, polyester resin, fluorine resin, olefin resin, such as polyethylene resin and a polypropylene resin, etc., cellulose resin, and a urethane resin, and others.

[0141] The reflective element layer (1) in the present invention is generally provided with the air layer (3) at the back surface of a cube-corner retroreflective element for the

purpose of increasing the critical angle satisfying all the internal reflection conditions. In order to prevent a defect, such as decreases in critical angle due to the entry of moisture under the use conditions, corrosion of a metallic layer, etc., the reflective element layer (1) and the holder layer (7) are preferably sealed by the bonding agent layer (6). As a sealing method, a method described in US Patent No. 3,190,178, US Patent No. 4,025,159, and Japanese Unexamined Utility Model Application Publication No. 1975-28669 can be used. Examples of the resin used for the bonding agent layer (6) are (meth)acrylic resin, polyester resin, alkyd resin, epoxy resin, and other resins. As a bonding method, a publicly-known thermal adhesiveness resin bonding method, thermosetting resin bonding method, ultraviolet curable resin bonding method, electron beam curable resin bonding method, etc. can be used as necessary.

[0142] The bonding agent layer (6) that is used for the present invention can be coated on the whole area of the holder layer (7) and can be provided selectively to the bonding parts with the retroreflective element layer by the printing method, etc.

[0143] As an example of the material constituting the holder layer (7), resin comprising of the retroreflective element layer, resin that can form general films, textiles, fabrics, and metallic foils or plates, such as stainless or aluminum, etc., can be used alone or in combination respectively.

...

[0160] With this, the retroreflective sheet in the present invention can improve the wide-angle property of the observation angle property, incident angle property, rotation angle property, etc. in addition to high luminance, which is a basic optical property generally desired for a triangular pyramidal cube-corner retroreflective sheet, in other words, the level of reflection luminance represented by the reflection luminance of the incident light from the front of the sheet.

[FIG. 13]