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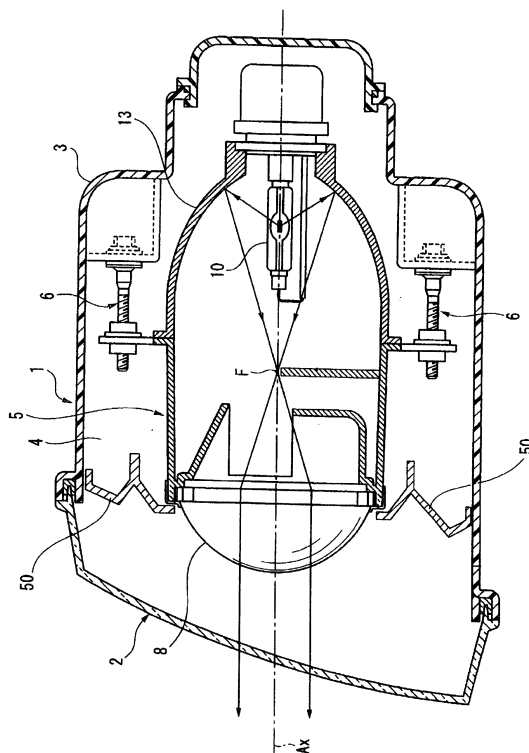
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(54) **VEHICLE LAMP**

(57) There is provided a vehicle lamp 1 that uses a lamp body 3 that is formed from a resin composition containing a base resin and a vegetable fiber, wherein an external appearance failure such as fogging is prevented from being generated on an inner side of a front cover 2 that faces an interior of a light compartment while in use. The vehicle lamp 1 includes the lamp body 3 that is opened at the front thereof and the front cover 2 that is attached to the lamp body 3 to close a front opening portion thereof, and the lamp body 3 is formed from a resin composition containing a base resin and a surface treated vegetable fiber.

FIG. 1



Description**Technical Field**

5 [0001] The present invention relates to a vehicle lamp and particularly to a vehicle lamp that is light and highly strong and that is free from an external appearance failure such as fogging that is generated on an inner side of a front cover that faces an interior of a lamp compartment.

Background Art

10 [0002] In recent years, it has been desired to reduce the weight of vehicles to be manufactured, and to make this happen, the reduction in weight of parts that make up a vehicle is in progress. Lamps are included in those parts that are required to be reduced in weight.

15 [0003] In general, vehicle lamps have a lamp body that is opened at a front thereof, a front cover that is attached to the lamp body to close the front opening portion, an extension, a reflector, a light source, electric components and the like. To reduce the total weight of such a vehicle lamp, it is considered to be effective to reduce the weight of the lamp body that is generally formed from a resin material and that occupies a relatively large portion of the total weight of the vehicle lamp.

20 [0004] On the other hand, as to a resin molded part that is formed from a resin material, in the event that the resin molded part is formed only from a resin, a sufficient strength is not attained, and therefore, it is general practice to add a filling material (a filler) to a base resin. As a preferable filler for such a resin molded part that is required to have a certain mechanical strength, a mineral filler like talc that has a relatively large specific weight has been used.

[0005] From this fact, to attain a reduction in weight of the resin molded part that is formed from a resin material while maintaining the mechanical strength, it is considered to be effective to use a filler having a smaller specific weight.

25 [0006] Patent Document 1 discloses a technology to obtain a molded part from a resin composition that contains a polypropylene and a vegetable fiber.

Prior Art Document**30 Patent Document**

[0007] Patent Document 1: JP-A-2011-88997

Summary of the Invention**35 Problem that the Invention is to Solve**

[0008] However, when a lamp is fabricated by using such a lamp body that is formed from a resin composition containing a base resin and a vegetable fiber, there has been caused a problem that an external appearance failure such as fogging is generated on an inner side of a front cover that faces an interior of a lamp compartment while in use.

40 [0009] In view of these situations, the invention is to provide a vehicle lamp using a lamp body that is formed from a resin composition containing a base resin and a vegetable fiber that is free from an external appearance failure such as fogging that is generated on an inner side of a front cover that faces an interior of a lamp compartment while in use.

45 Means for Solving the Problem

[0010] As a result of a deep study by the inventor and others, the problems described above could be solved by adopting the following configurations.

50 [0011] Namely, the invention is as follows.

(1) A vehicle lamp including a lamp body that is opened at a front thereof and a front cover that is attached to the lamp body to close a front opening portion in the lamp body, wherein

the lamp body is formed from a resin composition containing a base resin and a vegetable fiber that is surface treated.

(2) The vehicle lamp described under (1) above, wherein

55 the vegetable fiber is at least one selected from the group consisting of pulp, jute hemp, Manila hemp, sisal hemp, ganpi, mitsumata, kozo, cedar, bamboo, cacao, kenaf, banana, pineapple, sugar cane, coconut palm, corn, bagasse, palm, reed, esparto, Sabaigurasu, hemp palm, banana tree, pine, mulberry, agave, wheat, rice, and hinoki cypress.

(3) The vehicle lamp described under (1) or (2) above, wherein the vegetable fiber that is surface treated is subjected

to a sizing treatment.

(4) The vehicle lamp described under any one of (1) to (3) above, wherein the base resin is at least one selected from the group consisting of polypropylene, polyethylene, polylactic acid, polycarbonate, polyethylene terephthalate, polybutylene terephthalate, polystyrene, acrylonitrile-butadiene-styrene copolymer, acrylonitrile-styrene-acrylate copolymer, acrylonitrile-ethylene-styrene copolymer, chlorinated polyethylene-acrylonitrile-styrene copolymer, polyamide, polyphenylene sulfide, liquid crystal polymer, polysulfone, epoxy resin, urethane resin, and silicone resin.

[0012] In the event that a lamp is formed by using the lamp body formed from the resin composition containing the vegetable fiber, an external failure such as fogging is generated on an inner side of a front cover that faces an interior of a lamp compartment while in use. Although not clearly identified, the following are considered as causing the problem.

[0013] A vegetable fiber tends to absorb water easily. In the event that a vehicle lamp having a lamp body containing a vegetable fiber that holds water absorbed thereby is used, the water contained in the vegetable fiber of the lamp body is emitted therefrom by heat from a light source or the like, causing fogging inside the lamp compartment.

[0014] In contrast with this, according to the invention, it is assumed that the emission of water from the vegetable fiber is restricted by using the surface treated vegetable fiber for the lamp body, eliminating the generation of fogging in the lamp compartment.

Advantage of the Invention

[0015] According to the invention, the generation of fogging in the lamp compartment can be eliminated by using the surface treated vegetable fiber for the lamp body.

Brief Description of the Drawings

[0016] Fig. 1 is a schematic sectional view showing an example of a vehicle lamp of the invention.

Description of Embodiments

[0017] Hereinafter, a preferred embodiment of a vehicle lamp of the invention will be described in detail.

[0018] An example of a vehicle lamp of the invention will be described by reference to a schematic sectional view shown in Fig. 1.

[0019] A vehicle lamp 1 of the invention has a clear, transparent front cover 2 and a lamp body 3. A lamp unit 5 is supported in a lamp compartment 4 in the lamp body 3 that is defined by the front cover 2 and the lamp body 3 via an aiming mechanism 6. The lamp unit 5 shown in Fig. 1 includes a projection lens 8, a light source 10, and a reflector 13. Additionally, an extension 50 is disposed at the rear of the front cover 2 to cover an inner surface of the lamp body 3 in such a way that the projection lens 8 is exposed.

[0020] The lamp body 3 that is used in the vehicle lamp of the invention (hereinafter, also referred to as the "lamp body of the invention") will be described.

[0021] As has been described above, the lamp body 3 of the invention has a shape that is opened at the front, and the front cover 2 is attached to a front opening portion of the lamp body 3.

[0022] Additionally, the lamp body 3 of the invention is molded from a resin composition that contains a base resin and a vegetable fiber that is surface treated.

[0023] There is imposed no specific limitation on the vegetable fiber that is used in a resin composition that is used, in turn, to mold the lamp body 3 of the invention. However, there are exemplified pulp, jute hemp, Manila hemp, sisal hemp, ganpi, mitsumata, kozo, cedar, bamboo, cacao, kenaf, banana, pineapple, sugar cane, coconut palm, corn, bagasse, palm, reed, esparto, Sabaigurasu, hemp palm, banana tree, pine, mulberry, agave, wheat, rice, hinoki cypress and the like. Among them, pulp is preferable in that pulp contains few impurities that corrode a mold used to mold the lamp body 3.

[0024] There is imposed no specific limitation on the surface treatment given to the vegetable fiber. However, there are exemplified methods for forming a substance of low moisture permeability on the surface of the vegetable fiber (a spattering method, a vapor deposition method, a plasma CVD, a sol-gel method, a sizing method). In particular, the sizing method is preferable because a water repellent treatment can easily be performed during kneading work.

[0025] There are exemplified, as the low moisture-permeability substance, silane coupling agent, hydrophobic resin, fluorine water repellent, rosin soap, alkyl ketene dimer, alkenyl succinic anhydride, polyvinyl alcohol, various metal films and the like. In particular, hydrophobic resin is preferable in consideration of workability, as well as simple and convenient process.

[0026] As hydrophobic resins described above, there are exemplified terpene, thermoplastic fluorine resin, vinylidene

chloride, high-density polyethylene and the like.

[0027] What is preferable as the surface treated vegetable resin used in this embodiment is sized pulp. Sized pulp is preferable because sized pulp contains few impurities that cause the corrosion of a mold that is used to mold the lamp body 3 as described above.

[0028] There is imposed no specific limitation on the content of the surface treated vegetable fiber, and it is preferable to select an appropriate one depending upon the kind of a vegetable fiber to be used, the kind of a base resin, which will be described later, to be used together with, or the like. However, it is preferable to contain 5 to 80 mass% of vegetable fiber in the lamp body 3 of the invention (a resin composition used to mold the lamp body 3), and it is more preferable to contain 15 to 60 mass% of vegetable fiber.

[0029] There is imposed no specific limitation on a base resin that is used in a resin composition used to mold the lamp body 3 of the invention. There are exemplified polypropylene (PP), polyethylene (PE), polylactic acid (PLA), polycarbonate (PC), polyethylene terephthalate (PET), polybutylene terephthalate (PBT), polystyrene (PS), acrylonitrile-butadiene-styrene copolymer (ABS), acrylonitrile-styrene-acrylate copolymer (AAS), acrylonitrile-ethylene-styrene copolymer (AES), chlorinated polyethylene-acrylonitrile-styrene copolymer (ACS), polyamide (PA), polyphenylene sulfide (PPS), liquid crystal polymer (LCP), polysulfone (PSU), epoxy resin, urethane resin, and silicone resin. Among them, PP is preferable.

[0030] In preparing a resin composition to be used in molding the lamp body 3 of the invention, kneading should be performed so that at least the base resin and the surface treated vegetable fiber are mixed uniformly.

[0031] There is imposed no specific limitation on a kneading method to be used then, and hence, a variety of kneading methods can be adopted, including a known screw kneading or the like.

[0032] The front cover 2 used in this invention is clear and transparent, and therefore, there is imposed no specific limitation on shape and material therefor, as long as the front cover 2 can close the front opening portion of the lamp body 3 so as to define the lamp compartment. Thus, known shapes and materials can be used. There are exemplified, as materials, a clear thermoplastic resin such as polycarbonate, acrylic resin and polystyrene, a transparent inorganic material such as glass and the like.

Example

[0033] Hereinafter, the invention will be further described in detail by showing the results of evaluation tests carried out using an example according to the embodiment and a comparative example. It should be noted that the invention is not limited to the example.

[Example 1]

(Preparation of pellets)

[0034] 8 wt% of hydrogenated terpene and 12 wt% of PP (base resin) were added to 80 wt% of pulp fiber (fiber length: 200 μ m) and kneaded, and the mixture was made as pulp fiber to which a water repellent treatment had already been applied.

[0035] 75 wt% of base resin PP was added to 25 wt% of pulp fiber to which the water repellent treatment had already been applied to adjust the content of pulp fiber to 20 wt%. The mixture was kneaded again to obtain PP pellets containing 20 wt% of pulp fiber to which the water repellent treatment had already been applied.

[0036] The pellets obtained were poured into an injection molding machine (EC40N manufactured by Toshiba Machine Co., Ltd.) and were injection molded into a rectangular plate-shaped test piece of 110 mm x 60 mm x 3 mm at a cylinder temperature of 190°C and a mold temperature of 40°C.

[Comparative Example 1]

[0037] Pellets were prepared by the same method as that used in Example 1 except that 20 wt% of pulp fiber and 80 wt% of base resin PP were kneaded.

[0038] Plate-shaped test pieces obtained in Example 1 and Comparative Example 1 were measured for water absorption. A method for measuring water absorption is as follows, and the results of the measurements are shown in Table 1 below.

(Measurement of water absorption)

[0039]

- The test pieces were placed stationary in an oven heated to 90°C to be dried for 48 hours, as pretreatment. Weights of the test pieces then were referred to as initial weights, and water absorption of the test pieces then were specified as 0%.
- The dried pellets were placed in a constant-temperature and constant-humidity chamber of 95% RH at 60°C, and changes in weight after a predetermined period of time had elapsed were referred to as water absorption of the test pieces.
- The water absorption amount obtained after the predetermined time had elapsed were divided by the initial weights, respectively, and the resulting values were defined as water absorption.

[Table 1]

	Times elapsed under environment of 60°C and 95% RH and water absorption at the times			
	0 hour	22 hours	217 hours	605 hours
Example 1	0%	0.6%	1.3%	1.8%
Comparative Example 1	0%	0.7%	1.7%	2.4%

[0040] The test piece of Example 1 could be reduced by about 25% in water absorption as compared with the test piece of Comparative Example 1.

[0041] While the invention has been described in detail by reference to the specific embodiment, it is obvious to those skilled in the art to which the invention pertains that various alterations and modifications can be made thereto without departing from the spirit and scope of the invention.

[0042] This patent application is based on Japanese Patent Application (No. 2012-135790) filed on June 15, 2012, the contents of which are incorporated herein by reference. Additionally, all the references cited herein are incorporated.

Industrial Applicability

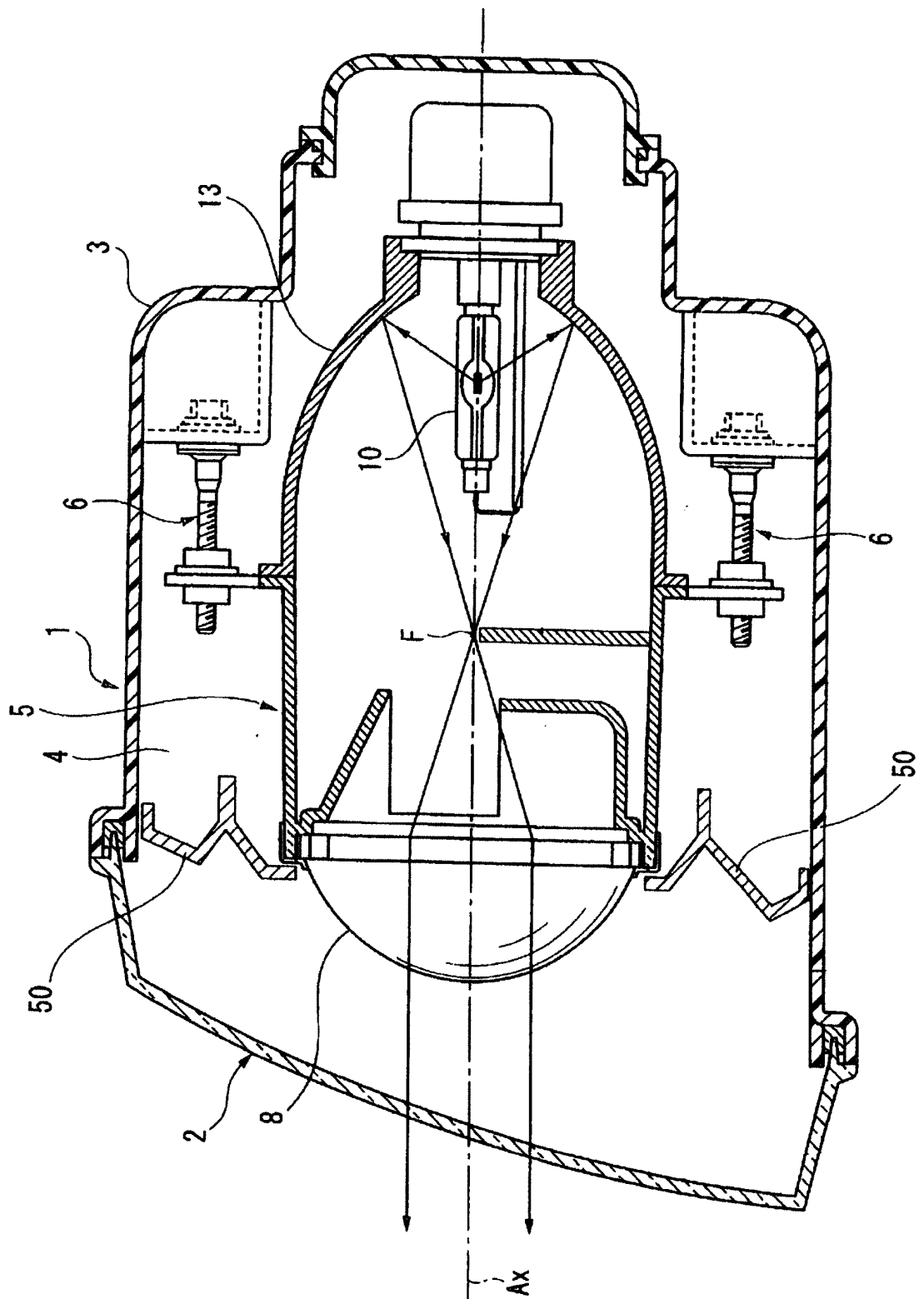
[0043] According to the vehicle lamp of the invention, the generation of fogging in the interior of the lamp compartment can be eliminated by using the surface treated vegetable fiber for the vegetable fiber to be contained in the lamp body, making the lamp so fabricated extremely useful as a vehicle lamp. Description of Reference Numerals

[0044] 1 vehicle lamp; 2 front cover; 3 lamp body; 4 lamp compartment; 5 lamp unit; 6 aiming mechanism; 8 projection lens; 10 light source; 13 reflector; 50 extension.

Claims

- A vehicle lamp including a lamp body that is opened at a front thereof and a front cover that is attached to the lamp body to close a front opening portion in the lamp body, wherein the lamp body is formed from a resin composition containing a base resin and a vegetable fiber that is surface treated.
- The vehicle lamp according to Claim 1, wherein the vegetable fiber is at least one selected from the group consisting of pulp, jute hemp, Manila hemp, sisal hemp, ganpi, mitsumata, kozo, cedar, bamboo, cacao, kenaf, banana, pineapple, sugar cane, coconut palm, corn, bagasse, palm, reed, esparto, Sabaigurasu, hemp palm, banana tree, pine, mulberry, agave, wheat, rice, and hinoki cypress.
- The vehicle lamp according to Claim 1 or 2, wherein the vegetable fiber that is surface treated is subjected to a sizing treatment.
- The vehicle lamp according to any one of Claims 1 to 3, wherein the base resin is at least one selected from the group consisting of polypropylene, polyethylene, polylactic acid, polycarbonate, polyethylene terephthalate, polybutylene terephthalate, polystyrene, acrylonitrile-butadiene-styrene copolymer, acrylonitrile-styrene-acrylate copolymer, acrylonitrile-ethylene-styrene copolymer, chlorinated polyethylene-acrylonitrile-styrene copolymer, polyamide, polyphenylene sulfide, liquid crystal polymer, polysulfone, epoxy resin, urethane resin, and silicone resin.

FIG. 1



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2013/065197

A. CLASSIFICATION OF SUBJECT MATTER

F21S8/10(2006.01)i, F21W101/10(2006.01)n

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F21S8/10, F21W101/10

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2013

Kokai Jitsuyo Shinan Koho 1971-2013 Toroku Jitsuyo Shinan Koho 1994-2013

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2012-18887 A (Stanley Electric Co., Ltd.), 26 January 2012 (26.01.2012), paragraphs [0027] to [0053]; fig. 1 to 9 (Family: none)	1-4
Y	JP 2010-277892 A (Koito Manufacturing Co., Ltd.), 09 December 2010 (09.12.2010), paragraphs [0020] to [0033]; fig. 1 to 3 (Family: none)	1-4
Y	JP 1-242234 A (Koito Manufacturing Co., Ltd.), 27 September 1989 (27.09.1989), page 1, lower right column, line 5 to page 3, upper right column, line 2; fig. 1 to 2 (Family: none)	1-4

☒ Further documents are listed in the continuation of Box C.
 ☐ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search
02 August, 2013 (02.08.13)Date of mailing of the international search report
13 August, 2013 (13.08.13)Name and mailing address of the ISA/
Japanese Patent Office

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2013/065197

5	C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
10	Y	WO 2010/138842 A1 (XL TERRA, INC.), 02 December 2010 (02.12.2010), page 40, line 32 to page 42, line 11 & JP 2012-528198 A & US 2012/0136070 A1 & US 2012/0157560 A1 & CA 2761157 A1 & CN 102448303 A	1-4
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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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- JP 2012135790 A [0042]