

Method for Searching Optical Instrument Patents

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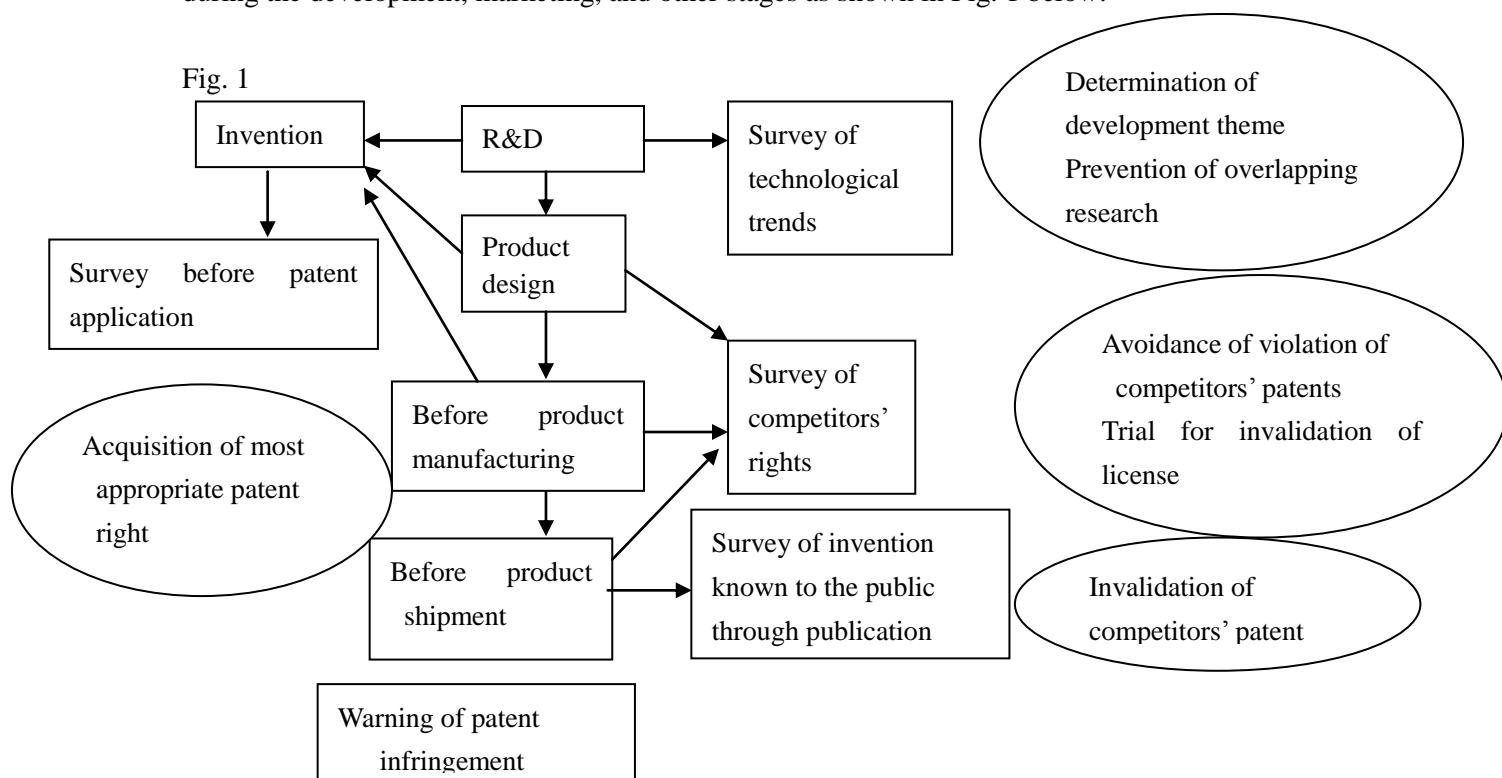
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1. Purpose of Patent Search

Patent information may be used as prior art documents, which are obtained through retrieval from various databases containing patent documents, which is called patent search. Companies that develop and market new products conduct various patent searches as required during the development, marketing, and other stages as shown in Fig. 1 below.

Fig. 1



Technological trends are surveyed to investigate what technologies competitors are developing. Therefore, the prior art documents covered by patent searches are published patent documents such as published unexamined patent applications which include not only their claims but also detailed explanations of inventions and descriptions of drawings. An invention, once a patent application is filed, is laid open after 18 months from the date of filing in principle. Therefore, searching published patent documents will provide information on competitors' technological development trends (technological trends), based on which a company can decide its own research themes and directions and investigate solutions to current technological issues.

A survey of competitors' patent rights is conducted to investigate whether or not one's own products may infringe on the patent rights of a competing company (or another person). Accordingly, the prior art documents covered by the search are patent documents such as patent gazettes that contain granted patent rights and claims. When a company's products violate the patent rights of a competing company (or another person), it may face claims for damages and suspension of manufacturing and sales of its own products. Therefore, companies need to search patents rights and other rights possessed by competitors as part of risk management from the early stage of product development and design.

A survey of inventions known to the public through publication is conducted for the purpose of invalidating the patent rights of a competing company (or another person). Therefore, the prior art documents covered by the patent search are published patent documents such as published unexamined patent applications containing not only their claims, but also detailed explanations of inventions and descriptions of drawings. A company may, unfortunately, face claims for damages and suspension of manufacturing and sales of its own products if they are found to violate the patent rights of a competing company (or another person) and do not take any countermeasures. However, since patents are not necessarily complete and perfect and often contain a cause of invalidation, it is necessary to search prior arts to deny the novelty and inventive step of the patented claims, or to narrow the scope of the patents in order to avoid claims for damages and suspension of manufacturing and sales of one's own products.

A survey before applying for a patent is conducted for the purpose of determining whether the claims to be filed are novel and inventive. Therefore, the prior art documents covered by the patent search are published patent documents, such as published unexamined patent applications containing not only their claims, but also detailed explanations of inventions and descriptions of drawings. By searching published patent documents, a company determines whether or not it is necessary or worthwhile to apply for a patent on the research results (inventions) that it has developed.

At the Japan Patent Office, patent searches are conducted mainly to determine the patentability of filed patent applications, and more specifically to assess novelty and inventive step. In this case, the prior art documents covered by the patent search are published patent documents such as published unexamined patent applications containing not only their claims, but also detailed explanations of inventions and descriptions of drawings. The scope of patent searches is not limited to Japanese patent gazettes, but may include patents gazettes around the world, or at least those included within the PCT minimum documentation. In addition, the Japan Patent Office sometimes conducts patent research to assess the existence of precedent applications and what is called novelty due to the effect of prior art. In such cases, the search may include the content of the application for patents prior to laying them open.

This document explains the patent searches that are conducted by examiners in the Japan Patent Office for the purpose of assessing the novelty and inventive step of an invention for which a patent application is made. The readers of this document are assumed to be examiners in different countries, who conduct patent searches mostly for assessing novelty and inventive step rather than for any other purpose. For business readers, the assessment of novelty and inventive step required in a survey before applying for a patent, as well as a survey of competitors' patent rights and a survey of inventions known to the public through publication as described above, is no different from that required by examiners when conducting patent searches. In other words, it is impossible to determine patentability without knowing how examiners conduct assessments. It is also important to note that novelty and inventive step are assessed according to the examination standards of the Japan Patent Office.

Furthermore, the prior art documents, which this document uses as the scope of patent searches, are published unexamined Japanese patent applications for which Patent Abstracts of Japan (PAJ) are available. This is because it is assumed that the documents are read by those who understand English but not Japanese, and who can access the IPDL of the Japan Patent Office through the Internet. In addition, it should be noted that patent information for which PAJ are available are mainly official gazettes published in 1990 or later, as well as the fact that no utility models are contained, and that some expressions (especially claims) are not natural due to machine translation (automatic translation by a computer).

Furthermore, this document's explanations assume that there are only FI and F term search tools, because these tools were developed by the Japan Patent Office and are most often used by Japanese examiners. FI, based on IPC, provides more detailed classification containing 190,000 items. Its structure is similar to that of the ECLA (130,000 items) of the European Patent Office. Additionally, the USPC (170,000 items) of the United States Patent and Trademark Office, while utilizing a unique classification system, provides a list of concordance to IPC. This document does not refer to the ECLA or USPC. For more information, visit the websites of the European Patent Office and the United States Patent and Trademark Office.

This document does not refer to either searches using search keys such as keywords, number, IPC, name, and date, nor to searches using commercial databases. The IPDL, however, allows PAJ searches using search keys such as keywords, date of gazette issuance, IPC, and number of gazette, and should be used as necessary.

2. Fields of Optical Instruments

This document explains how to search for patent information in the fields of optical instruments. Although there is no strict definitions for the terms "optical instruments" or "fields of optical instruments," we may assume that "fields of optical instruments" refers to the technical fields of which the Applied Optic Division and the Optical Devices Division of the First Patent Examination Department of the Japan Patent Office are in charge. The method for searching patent information in the said technical fields is explained herewith.

Shown below are the technical fields for which the Applied Optic Division and the Optical Devices Division of the First Patent Examination Department are in charge, as published on the website of the Japan Patent Office: Duplicating/Marking method {B41M (5/, 99/)}, Decoration by transfer pictures {B44C (1/16–1/175)}, Photoresist {G03F (7/00–7/18, 7/26–7/42)}, Photographic sensitive material/Photoprinting {G03C (1/, 3/00 301, 5/–11/)}, Electrophotography/Material {G03G (5/–11/)}, Lens/Optical equipment {G02B (7/–25/)}, Camera {G03B (1/–19/, 29/–31/, 35/–43/) G03C (3/00, 3/00 351–3/02)}, Optical elements/Glasses {G02B (1/–5/) G02C}, Holographic processing {G03H}, EL devices {H05B (33/)}, Semiconductor luminous elements/Laser {H01L (33/) H01S}, Semiconductor light receiving elements {H01L (31/)}, Optical fibers/Light guides {G02B (6/)}, Optical beam controlling {G02B (26/–27/) G02F (1/00–1/125, 1/21–7/)}, and Liquid crystals/Electronic

paper {G02F (1/13–1/19)}. Here, the alphanumeric characters in parentheses { } represent IPC or FI codes.

The F-term themes that fall into the technical fields for which the Applied Optic Division and the Optical Devices Division are in charge include those shown in the following Fig. 2 to Fig. 8.

The tables as seen in Fig. 2 to Fig. 8 show the information of theme code, deactivated status, analysis type (F-term type (multiaspect), FI type, or partial F-term type (where an “analysis NO” FI is present)), theme name and FI coverage (corresponding FIs), and the F-term data of maintenance information (description of maintenance), F-term theme, analysis period (year of analysis start and year of analysis end) and re-analysis status.

To conduct an F-term search, a theme code is selected according to the type of invention regarding the patent application by referring to the tables shown in Fig. 2 to Fig. 8.

3. Method for assessing novelty and inventive step

A basic method for assessing the novelty and inventive step of an invention is explained here according to the examination standards of the Japan Patent Office. Put simply, novelty means something that is not the same as the prior art, while inventive step means something that cannot be easily worked out based on the prior art. Prior art means an invention, or a technology, laid open before the patent application concerned was filed. In this document, it means a technology described in a published unexamined patent application as a published prior art document. It includes not only claims, but also detailed explanation and technologies described in drawings.

Fig. 2

Theme information					F-term data				
Theme code	Analysis Deactivated	Analysis type	Theme name	FI coverage	Maintenance information	F-term theme availability	Analysis period (year)		Under reanalysis
2H001		F	Optical fiber cable	G02B6/44, 351-6/44, 396	List re-created (H07)	○	1984		
2H002		F	Control of camera exposure	G03B7/00-7/28	List re-created (H06)	○	1990		
2H003	○		Electrostatic charge in electrophotography	(G03G13/02; 15/02-15/02, 103)	Integrated into 2H200 (H12)	○		2000	
2H004		FI	Photocomposition	B41B13/00-27/50	FI applied (H05)	○		1993	
2H005	○	F	Developer in electrophotography	(G03G9/00-9/10, 362; 9/16)		○			
2H006		Partial F	Spectacles	G02C1/00-13/00		○			
2H011		Partial F	Focus adjustment	G03B3/00-3/12		○			
2H012		Partial F	Sensitive material / original holders	G03B27/58-27/64.		○			
2H013		Partial F	Photographing using non-optical waves	G03B42/00-42/08		○			
2H014		FI	Cinecamera	G03B19/18-19/26					
2H015		FI	Details for motion picture projectors	G03B21/32-21/54@Z	FI applied (H05)	○		1993	
2H016		Partial F	Silver salt photography or processing agents for silver salt photography	G03C5/00-5/08; 5/10-5/17; 5/26-5/50; 7/00-7/46; 9/00-11/00; 11/00,501-11/24		○			
2H017		FI	Film-strip handling	G03B1/00-1/66					
2H018		Partial F	Viewfinders	G03B13/00-13/28		○			
2H019		FI	Procedures for taking photographs and apparatus	G03B15/00-15/035;15/06-15/16@Z	FI applied (H05)	○		1993	
2H020		Partial F	Details of camera (Film handling mechanism)	G03B17/00-17/00,101; 17/26-17/34; 17/38-17/46	List re-created (H06)	○	1980		
2H021		F	OHP and projection screen	G03B21/132; 21/56-21/64		○			
2H022		FI	Exposure apparatus for contact printing	G03B27/02-27/30	FI applied (H05)	○		1993	
2H023		Partial F	Photosensitive materials for silver salt photography	G03C1/00-1/00@Z;1/005-1/492; 1/74; 1/76;1/76,501-1/775; 1/785-		○			
2H024		FI	Film packages	G03C3/00-3/00@Z;3/00,351-3/02@Z					
2H025	○	Partial F	Photoresist materials	(G03C3/00,301; G03F7/004-7/04; 7/06,501; 7/075-7/115; 7/16-7/18)	Changed to 2H125 (H20)	○		2008	
2H026		F	Heat sensitive color forming recording	B41M5/18-5/18,114		○			
2H027	○	F	Control or security for electrophotography	G03G15/00,303; 21/00,370-21/00,392; 21/00,396-21/00,540)	Changed to 2H270 (H20)	○		2008	

Fig. 3

2H028		F	Counters in electrophotography and two-sided copying	G03G15/00,106; 21/00,394		○			
2H029		F	Electrophotography using other than the Carlson method	G03G15/00,115-15/00,120		○			
2H030	○	F	Color electrophotography	(G03G13/01; 15/01-15/01,117@Z	Changed to 2H300 (H13)	○		2001	
2H031		F	Magnetic brush developing in electrophotography	G03G13/09; 15/09-15/09,101		○			
2H032	○		Transfer and separation in electrophotography	(G03G13/14-13/16; 15/14-15/16,103)	Integrated into 2H200 (H12)	○		2000	
2H033		F	Fixing for electrophotography	G03G13/20; 15/20-15/20,565		○			
2H034	○		Cleaning in electrophotography, etc.	(G03G21/00-21/00,306)	Changed to 2H134 (H12)	○		2000	
2H035		Partial F	Discharging, photosensitive material shape in electrophotography	G03G21/00,340-21/00,360		○			
2H036		F	Mechanical coupling of light guides	G02B6/24-6/24,301;6/36-6-40	List re-created (H10)	○			
2H037	○	F	Optical coupling of light guides	(G02B6/26; 6/30-6/34; 6/42)	Changed to 2H137 (H15)	○		2003	
2H038		Partial F	Light guides in general and applications therefor	G02B6/00-6/00,351		○			
2H039		F	Telescope	G02B23/00-23/22		○			
2H040		F	Instruments for viewing the inside of hollow bodies	G02B23/24-23/26@Z		○			
2H041	○	F	Mechanical light control or optical switches	(G02B26/00-26/08@Z)	Changed to 2H141 (H18)	○		2006	
2H042		Partial F	Optical elements other than lenses	G02B5/00-5/136		○			
2H043		Partial F	Mounting and adjusting optical elements	G02B7/00-7/00@Z; 7/18-7/24		○			
2H044		Partial F	Lens barrels	G02B7/02-7/105@Z; 7/12-7/16		○			
2H045		F	Mechanical scanning systems using optical fibers	G02B26/10-26/10,109@Z		○			
2H046		F	Optical fiber bundles	G02B6/04-6/08		○			
2H047	○	F	Optical integrated circuits	(G02B6/12-6/14)	List re-created (H10), Changed to 2H147 (H16)	○		2004	
2H048		F	Optical filters	G02B5/20-5/28		○			
2H049	○	F	Diffraction gratings, polarizing elements, holograms used for optical elements	(G02B5/18; 5/30-5/32)	Separated into 2H149 and 2H249 (H19)	○		2007	
2H050	○	Partial F	Optical fibers or coated optical fibers	(G02B6/00,356-6/02@Z; 6/10-6/10@Z; 6/16-6/22; 6/44-6/44,346)	Changed to 2H150 (H17)	○		2005	
2H051	○	F	Automatic focusing adjustments	(G02B7/11-7/11@Z)	Changed to 2H151 (H21)	○		2009	
2H052		F	Microscopes and condensers	G02B19/00-21/00;21/06-21/36		○			
2H053		F	Stroboscope apparatuses	G03B15/04-15/05		○			

Fig. 4

2H054		F	Cameras in general	G03B19/00-19/16		○			
2H055		FI	Slide changers	G03B23/00-25/02					
2H056		FI	Cameras with a specific shape	G03B29/00					
2H057		FI	Talkies	G03B31/00-31/08					
2H058	○	FI	Specific color photography	(G03B33/00-33/16)	Integrated into 2K003 and changed to 2K103 (H13)			2001	
2H059		F	Stereoscopic and panoramic photography	G03B35/00-37/06		○			
2H060		FI	High-speed photography and other special techniques therefor	G03B39/00-41/14					
2H061		FI	Testing photographic apparatuses	G03B43/00-43/02					
2H062		FI	Materials for use in transferring in electrophotography	G03G7/00-7/00,101@Z					
2H063		FI	Protective layers in electrophotography	G03G8/00					
2H064		FI	Fixing agents in electrophotography	G03G11/00					
2H065		FI	High-volume copying for use in electrophotography	G03G15/00,104					
2H066		FI	Warming in electrophotography	G03G13/12; 15/12					
2H067		FI	Transferring electrostatic images in electrophotography	G03G13/18; 15/18-15/18,101					
2H068		F	Photoreceptors in electrophotography	G03G5/00-5/16		○			
2H069		F	Liquid developers in electrophotography	G03G9/12-9/14; 9/18		○			
2H070	○	F	General electrophotography and electrophotography plate-making	(G03G13/00; 13/26-13/32)	2H070 and 2H071 integrating into one and list re-created; Changed to 2H170 (H13)	○		2001	
2H071	○	Partial F	General electrophotography and overall configuration and components	(G03G15/00; 15/00,550-15/00,556)	2H070 and 2H071 integrated into one and list re-created; Changed to 2H171 (H13)	○		2001	
2H072		F	Paper feeding for electrophotography	G03G15/00,510-15/00,534		○			
2H073		F	Developing for electrophotography in general; Developing bias	G03G13/06; 15/06-15/06,102		○			
2H074		F	Wet developing in electrophotography	G03G13/10; 15/10-15/10,117		○			
2H075		FI	Magnetic photography in electrophotography	G03G16/00-19/00	FI applied (H05)	○		1993	
2H076		F	Exposure or original feeding in electrophotography	G03G13/04-13/056; 15/00,107; 15/04-15/056; 21/00,365		○			
2H077		F	Dry development in electrophotography	G03G13/08-13/08@Z; 15/08-15/08,507@Z		○			
2H078		Partial F	Combination of more than one stop in electrophotography	G03G13/22-13/24;15/22-15/32		○			
2H079		F	Modulation of light	G02F1/00-1/125		○			

Fig. 5

2H080		F	Diaphragms for cameras	G03B9/00-9/07@Z		○			
2H081		F	Shutters for cameras	G03B9/08-9/54		○			
2H082		F	Shutter-related mechanisms	G03B9/58-9/70@Z		○			
2H083		F	Blocking light for cameras	G03B11/00-11/06		○			
2H084		Partial F	Manufacture or reproduction of printing forms	B41C1/00-3/08; B41D1/00-99/00		○			
2H085		F	Color printing	B41M5/12-5/16,114; 5/22-5/22,114		○			
2H086	○	F	Duplication or marking	(B41M5/00-5/03; 5/04-5/10)	Changed to 2H186 (H16)	○		2004	
2H087		F	Lenses	G02B9/00-17/08@Z; 21/02-21/04; 25/00-25/04	List re-created (H07)	○	1991		
2H088		F	Liquid crystal 1 (Applications and principles)	G02F1/13-1/1/13,102; 1/13,505; 1/137-1/141	List re-created (H06)	○	1989		
2H089	○	F	Liquid crystal 2 (Structures in general, spacers, inlets or sealing materials)	(G02F1/133-1/133,500; 1/133,540; 1/1333; 1/1334; 1/1339-1/1341; 1/1347)	List re-created (H06), Changed to 2H189	○	1989.	2007	
2H090	○	F	Liquid crystal 3 (Substrates, insulated films and oriented members)	(G02F1/1333,500-1/1333,505; 1/1337-1/1337,530)	List re-created (H06)	○	1972		
2H091	○	F	Liquid crystal 4 (Combination with optical members)	(G02F1/1335-1/13363)	List re-created (H06); Changed to 2H191 (H19)	○	1989	2007	
2H092		F	Liquid crystal 5 (Electrodes and active matrixes)	G02F1/1343-1/1345; 1/135-1/1368	List re-created (H06)	○	1989		
2H093	○	F	Liquid crystal 6 (Drive)	(G02F1/133,505-1/133,535; 1/133,545-1/133,580)	List re-created (H06); Changed to 2H193 (H20)	○	1989	2008	
2H094		FI	Diffusion transfer	G03C8/00-8/56,502					
2H095		Partial F	Preparation of originals or masks in photomechanical processes	G03F1/00-1/92@Z		○			
2H096		F	Treatment of photosensitive resins or photoresists	G03F7/00-7/00,506; 7/06; 7/07; 7/12-7/14; 7/26-7/42		○			
2H097		Partial F	Exposure and positioning of photosensitive materials comprising photoresists	G03F7/20-7/34@Z; 9/00-9/02@Z		○			
2H098		Partial F	Photographic processing devices using wet methods	G03D3/00-5/06; 11/00; 15/00-17/00		○			
2H099	○	Partial F	Other optical systems, devices; Interference of light, control of color	(G02B27/00-27/64; G02F1/21-1/25)	List created (H07); Changed to 2H199 (H17)	○		2005	
2H100		Partial F	Camera bodies and camera details (components)	G03B17/02; 17/22		○			
2H101		F	Camera body structures and mechanisms	G03B17/04-17/17		○			
2H102		F	Indication in cameras, and counting of exposures	G03B17/18-17/20; 17/36		○			
2H103		F	Camera data copying or recording	G03B17/24		○			
2H104		F	Cameras adapted for combination with other photographic or optical apparatuses	G03B17/48-17/55		○			
2H105		F	Accessories of cameras	G03B17/56-17/58		○			

Fig. 6

2H106		F	Projection-type copiers in general	G03B27/32-27/32@Z; 27/42-27/48		○			
2H107		F	Variable magnification in projection-type copying machines	G03B27/34-27/40		○			
2H108		F	Optical systems of projection-type copiers	G03B27/50-27/50@Z		○			
2H109		F	Light sources and details of projection-type copiers	G03B27/52-27/56; 27/66-27/70		○			
2H110		F	Control of exposure in printing and copying	G03B27/72-27/80		○			
2H111		F	Thermal transfer or thermal recording in general	B41M5/035; 5/26-5/26,102		○			
2H112		F	Photographic developing apparatuses	G03D9/00-9/02; 13/00-13/14		○			
2H113		F	Printing method	B41M1/00-3/18; 7/00-9/04		○			
2H114		Partial F	Printing plate and materials therefor	B41N1/00-99/00		○			
2H115		FI	Hand composition	B41B1/00-11/96					
2H116		FI	Marking, etc.	B41M5/20-5/20,114; 5/24					
2H117		FI	Color separation, color correction, and screening processes in photomechanical process	G03F3/00-5/24					
2H118		FI	Gas processing apparatuses	G03D7/00					
2H123		F	Non-silver salt photosensitive materials and non-silver salt photography	G03C1/00,531; 1/494-1/735,501; 1/74,351; 1/76,351-1/76,352; 1/775,501; 1/79,501; 1/795,501; 1/91,501; 5/08,351; 5/18-5/22; 5/56-5/60; 11/00,351		○			
2H125		Partial F	Materials for photolithography	G03C3/00,301; G03F7/004-7/04; 7/06,501; 7/075-7/115; 7/16-7/18	List re-created for old 2H025 (H20); Re-analysis to terminate H27FY	○	2000		○
2H134		F	Cleaning in electrophotography, etc.	G03G21/00-21/00,334; 21/00,550-21/00,578	List re-created for old 2H034 (H12)	○	1988		
2H137		F	Optical coupling of light guides	G02B6/26; 6/30-6/34; 6/42	List re-created for old 2H037 (H15)	○			
2H141		F	Mechanical light control or optical switches	G02B26/00-26/08@Z	List re-created for old 2H041 (H18)	○			
2H147		F	Optical integrated circuits	G02B6/12-6/14	List re-created for old 2H047 (H16)	○			
2H149		F	Polarizing elements	G02B5/30	List re-created for old 2H049 (H19)	○	1989		
2H150		Partial F	Optical fibers or coated optical fibers	G02B6/00,356-6/02@Z; 6/10-6/10@Z; 6/16-6/22; 6/44-6/44,346	List re-created for old 2H050 (H17)	○			
2H151		F	Automatic focusing adjustments	G02B7/11-7/11@Z	List partially revised for old 2H051 (H21)	○			
2H170		F	Electrophotographic plate-making	G03G13/26-13/32	Separated into 2H171; List re-created for old 2H070 (H13)	○			
2H171		F	General electrophotography, overall configuration and components	G03G13/00; 15/00,550-15/00,556	2H070 and 2H071 separated and integrated list re-created (H13) Search Information Planning Section	○	1992		

Fig. 7

2H186		F	Ink jet recording methods and recording media thereof	B41M5/00@A-5/00@E	Partial FI separated from old 2H086 and list re-created (H16)	○			
2H189		F	Liquid crystal 2 (Structures in general, spacers, inlets or sealing materials)	G02F1/133-1/133,500; 1/133,540; 1/1333; 1/1334; 1/1339-1/1341; 1/1347	List re-created for old 2H089 (H19)	○			
2H190		F	Liquid crystal 3-1 (Substrates and insulated films)	G02F1/1333,500-1/1333,505	Separated from 2H090; List re-created (H23)	○			○
2H191		F	Liquid crystal 4 (Combination with optical members)	G02F1/1335-1/13363	List re-created for old 2H091 (H19)	○			
2H193		F	Liquid crystal 6 (Drive)	G02F1/133,505-1/133,535; 1/133,545-1/133,580	List re-created for old 2H093 (H20)	○	2009		
2H199		Partial F	Other optical systems, or apparatus, color interference, or control of color	G02B27/00-27/64;G02F1/21-1/25	Old 2H099; List re-created (H17)	○			
2H200		F	Electrostatic charge, transfer, and separation in electrophotography	G03G13/02; 13/14-13/16; 15/02-15/02,103; 15/14-15/16,103	2H003 and 2H032 integrated into one and list re-created (H12)	○	1988		
2H249		F	Diffraction gratings or hologram optical elements	G02B5/18; 5/32	Separated from old 2H049 (H19)	○			
2H270		F	Control and security for electrophotography	G03G15/00,303; 21/00,370-21/00,392; 21/00,396-21/00,540	List re-created for old 2H027 (H20), H24FY re-analysis to be terminated	○	2009		○
2H286		Partial F	Duplication or marking	B41M5/00;5/00@F-5/03;5/04-5/10;99/00	Partial FI separated from old 2H086 (H16)	○			
2H290		F	Liquid crystal 3-2 (Oriented members)	G02F1/1337-1/1337,530	Separated from 2H090, List re-created (H23), H26FY re-analysis to be terminated	○			○
2H300		F	Color electrophotography	G03G13/01;15/01-15-01,117@Z	List re-created for old 2H030 (H13)	○	1988		
2H500		F	Developers for electrophotography	G03G9/00-9/10,362;9/16	List re-created for old 2H005 (H22), H29FY re-analysis to be terminated	○			○

Fig. 8

Theme information					F-term data				
Theme code	Analysis Deactivated	Analysis type	Theme name	FI coverage	Maintenance information	F-term theme availability	Analysis period (year)		Under reanalysis
2K001	○	Partial F	Variable absorption, or electrochromic display elements	(G02F1/15-1/19,501)	Changed to 2K101 (H20)	○		2008	
2K002	○	F	Light deflection, light demodulation, non-linear optics, optical logic elements	G02F1/29-7/00		○			
2K003		FI	Projectors	(G03B21/00-21/10@Z; 21/12-21/13; 21/134-21/30)	Integrated into 2H058, changed to 2K103 (H13)			2001	
2K004		FI	Microreaders	G03B21/11-21/11@Z					
2K005	○	Partial F	Adjustment of camera lenses	G03B5/00-5/08	FI themes converted into F-term themes (H23), H26FY reanalysis to be terminated	○			○
2K006		FI	Mixing and splitting waveguides	G02B6/28-6/28@Z					
2K007		FI	Photographic printing apparatuses in general	G03B27/00-27/00@Z					
2K008		F	Holography	G03H1/00-5/00	List created (H07)	○			
2K009		F	Surface treatment of optical elements	G02B1/10-1/12		○			
2K010		FI	Optical elements or lenses	G02B1/00-1/08; 3/00-3/14					
2K011		FI	Liquid crystal materials	G02F1/13,500					
2K101		F	Electrochromic elements, electrophoresis, or variable reflection or absorption elements	G02F1/15-1/19,501	List re-created for old 2K001, analysis YES/NO changed (H20)	○			
2K103		Partial F	Projectors	G03B21/00-21/10@Z; 21/12-21/13; 21/134-21/30; 33/00-33-16	2K003, and 2H058 integrated list created (H13)	○	1980		

Novelty and inventive step are assessed in order of the following processes: (1) Identifying the claimed invention (invention as claimed in the application concerned), (2) Identifying the prior art (technology described in the prior art documents found through searches), (3) Identifying identical and different features through comparison between the claimed invention and the prior art, and (4) examination of the difference.

To identify a claimed invention, its constituent features should be fully understood technologically, instead of a superficial, formal grasping of their wording. In other words, the most accurate identification of the claimed invention is accomplished when the technical means adopted by the claimed invention is identified with reference to the issue (purpose) that the claimed invention tries to solve, as well as the working effect. This will help specify the search target, providing an accurate and efficient search.

To identify the prior art, it is necessary to identify how the technical matter related to the claimed invention is described in the patent gazette as prior art documents found through searches. In interpreting the description of the prior art documents, common general technical knowledge may be taken into consideration. Thus, in consideration of common general technical knowledge at the time of filing the patent application concerned, matters that a person skilled in the art can derive from those described in the said prior art documents (“matters essentially described”) may be used as a basis to identify the prior art.

To identify identical and different features, the matters described in the claims of the application concerned (the claimed invention) are compared with the matters that are necessary to represent the prior art in words. When the claimed invention and the prior art are found to be identical, that is, when it is identified that all matters described in the claims of the application concerned are described in the prior art documents, the novelty of the claimed invention is denied. In this case, there is no need for assessing inventive step. In all other cases, by contrast, where both identical and different features are found, the different features are examined.

When examination of the said different features shows that they are not substantially different—that is, when the said different features are not substantial—the novelty of the claimed invention is denied. In this case, there is no need to assess inventive step. However, if substantial different features are found, other prior arts are taken into consideration to assess whether or not a person skilled in the art could easily overcome the said different features. If the different features are such that a person skilled in the art could easily overcome them, inventive step is denied. Otherwise, inventive step is accepted.

To assess inventive step, the state of the art at the time of application should be accurately figured out in the technical field to which the claimed invention pertains. Then, the action of a person skilled in the art should be taken into consideration to determine whether s/he could have easily arrived at a claimed invention based on the prior art. More specifically, after the claimed invention and one or more prior arts are identified, a prior art that is the most suitable for reasoning should be selected and used for comparison with the claimed invention. The identical and different features between the matters of the claimed invention and the matters to specify the prior art should then be clarified, based on which reasoning it is attempted to deny

the inventive step of the claimed invention with reference to the content of the prior art and other prior arts (including well-known and commonly used arts) and common general technical knowledge. Such reasoning may encompass various, broad-ranging points of view.

As a result, if reasoning has been successfully established, the inventive step of the claimed invention is denied. If it has not, inventive step is not denied.

4. Basic flow of patent search

Patent searches are conducted according to the following processes: (1) Identify the claimed invention, (2) Extract the features of the claimed invention from the search point of view, (3) Determine the search policy, (4) Determine the search area, (5) Determine the search formula, (6) Screen the results of retrieval, and (7) Select prior art documents and terminate the search. In principle, searches are conducted in order of processes (1) through (7). However, it is often necessary to return to earlier stages halfway and repeat them. For example, depending on the results of retrieval and those of screening, it is often necessary to revise the search area and the search formula.

An explanation of process (1), that is, identifying the claimed invention, is omitted because it is the same as assessments of novelty and inventive step.

In process (2), the claimed invention is broken down into constituents, which are further divided into important constituents (features) and those corresponding to general art. Then the important constituents are further divided into principal parts and adjunct parts and the principal parts are specified as a search target.

In processes (3) and (4), the search policy area are determined in consideration of additional prior arts searches since in some cases, only a single prior art cannot completely deny novelty and inventive step of the claimed invention. A determination is made, in other words, regarding which constituents of the claimed invention the search should focus on, as well as which technical field and F-term theme should be selected for the search.

In process (5), a determination is made regarding which and how many F-terms should be selected. In selecting F-terms, the FI-term list is taken into consideration. In creating a search formula, it is recommended that the search formula should first contain all the F-terms selected, and the F-terms except those corresponding to the principal parts of the invention should then be eliminated in order to gradually expand the search area.

Furthermore, inventive step should be considered when creating a search formula. For example, if three constituents (A, B, and C) form the core of the claimed invention, with three F-terms corresponding (term A, term B and term C), creating the following formula (1) alone is not sufficient: Formula (1): term A * term B * term C

Formula (1) only extracts the prior arts that include all constituents (A, B, and C). When inventive step is considered, however, some prior arts presenting similar arts may be useful. For example, a prior art with constituent A replaced by constituent A1; a prior art with constituent B replaced by constituent B1; and a prior art with constituent A replaced by constituent A1 and, furthermore, with constituent B replaced by constituent B1. In these cases,

the following formulae (2) to (4) must be created in addition to formula (1):

Formula (2): term A1 * term B * term C

Formula (3): term A * term B1 * term C

Formula (4): term A1 * term B1 * term C

In processes (6) and (7), the prior art documents that are useful for assessing novelty and inventive step are selected by screening multiple prior art documents that have been extracted in the searches using search formulae. The screening may cover dozens or hundreds of prior art documents, depending on the technical field. The actual number of documents to be screened in practice, however, will be 100 to 200 at most, because readers of the document are assumed to be those who understand English but not Japanese, and who can access the IPDL of the Japan Patent Office through the Internet, as explained in “1. Purpose of Patent Searches”. The documents presented as search results of an F-term search in the English version of the IPDL are the PAJ, or abstracts, and a downloading of the full text, although possible, would take time.

5. Overview of FI

Patent searches using the IPC can sometimes extract so many prior art documents that they cannot be screened when IPC subdivisions are used as they are. This is because IPC subdivisions are not fully subdivided in some technical fields.

To cope with this situation, the FI classification system as shown in Fig. 9 is used as necessary in some technical fields in Japan, wherein original subdivision symbols or file discrimination symbols, or both, are developed based on the IPC to add to the IPC symbols. “FI” stands for “File Index” and the system is used only in Japan as a means to smoothly use the IPC system; it is not intended for overseas use. The FI system consists of about 189,000 items as of 2010.

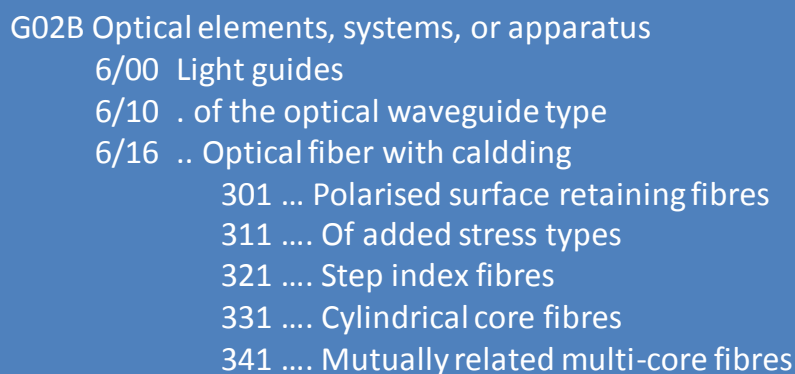
Fig. 9

IPC Symbol	A21D	2/04		
IPC Symbol + Filing Code	B01D	53/02		B
IPC Symbol + Subdivision Symbol	B31B	1/00	301	
IPC Symbol + Subdivision Symbol + Filing Code	C04B	35/58	104	B

The subdivision symbol is a classification symbol used to further divide the IPC group, which is the minimum unit of the IPC system. In principle, the subdivision symbol is a 3-digit

number, to which dots are added as shown in Fig. 10, as similarly seen in the IPC group, to represent the hierarchical classification structure relevant to the IPC. The subdivision symbol always accompanies the IPC full code.

Fig. 10



```

G02B Optical elements, systems, or apparatus
  6/00 Light guides
  6/10 . of the optical waveguide type
  6/16 .. Optical fiber with caldding
    301 ... Polarised surface retaining fibres
    311 .... Of added stress types
    321 .... Step index fibres
    331 .... Cylindrical core fibres
    341 .... Mutually related multi-core fibres
  
```

The file discrimination symbol is a classification symbol used to further divide the IPC or the subdivision symbol. The file discrimination symbol is a single alphabetical letter (with the exception of “I” or “O”). In addition, as shown in Fig. 11, the file discrimination symbol(s) is/are always accompanied by the file discrimination symbol “Z Others”, into which all those that are not associated with the presented file discrimination symbol(s) are classified. (This is considered equivalent to a higher hierarchical group in the classification system.)

Fig. 11



```

G03B Apparatus or arrangements for taking photographs or .....
G03B 23/00 Devices for changing pictures in viewing apparatus or projectors
G03B 23/02 . In which a picture is removed from a stock and .....
  A      for roll film
  B      for sheet film
  G      for endless film
  Z      Others
  
```

The FI, in principle, is constructed based on the latest version of the IPC to subdivide the classification, although some are based on the old version of the IPC.

The file discrimination symbols are originally designed for use in subdividing a classification with no overlaps, but a hierarchical structure is sometimes adopted for the file discrimination symbols. The hierarchical structure for the file discrimination symbols is represented by dots as shown in Fig. 11, but is independent of that of the IPC and subdivision symbols. The classification is presented according to the hierarchical structure in the file

discrimination symbols. Today, in response to technological progress and the increasing number of accumulated documents, the FI is revised once or twice a year including the addition, removal and updating of documents in order to maintain search precision and efficiency.

Moreover, when an FI is newly created, the documents classified according to the old FI in the past are re-classified according to the new FI (re-classification). While re-classification is being performed, searches should be conducted using both the new and old search indices.

Some technical fields apply facet classification symbols, which cover the entire or specified area of the FI (including subclasses and groups). This is based on a different approach to the FI, enabling searches from different perspectives.

The facet classification symbol uses three alphabetical letters as shown in Fig. 12. The first letter of the facet classification symbol is usually the same as that of the related section symbol, while the broad facet classification symbol, intended to provide efficient cross sectional searches, begins with the letter “Z” (e.g. ZNA: nucleic acid and amino acid; ZNM: nanotechnology application). The second and third letters are alphabetical letters excluding “I” and “O”. The facet classification symbols consisting of three alphabetical letters are designed not to overlap one another.

Fig. 12

B21B	Rolling of Metal
BBF	for blooming mills
BBG	for bar rolling mills
BBH	for metal plate rolling mills
BBJ	for thick plate rolling mills
BBK	for strip mill
BBL	for hot strip mill
BBM	Continuous type
BBN	for cold strip mill
BBP	Continuous type
BBQ	for skinpass rolling mill
BBR	for foil rolling mill
BBS	for tube rolling mill of seedling supply sections

6. Overview of F-Term

“F-term” stands for “File Forming Term”. This is a search index developed for computerized retrieval to cope with changing trends in technological development, including the increasing number of documents, technological combination and integration, and

diversified products. It is a quick and accurate search tool for investigating prior arts used in patent examinations or searches.

In some technical fields, the FI alone does not provide sufficiently detailed classification. Especially in new technical fields, the scope of a single FI contains extremely numerous prior art documents that require searching. In response, the F-term was created in order to provide more detailed FI classification from various technical viewpoints specific to individual technical fields. Therefore, the F-term is characterized by its ability to analyze and classify documents from a variety of viewpoints. The F-term is applied to each document based on a full understanding of the technical matters described in patent documents, including published unexamined patent applications, with reference to the F-term list created from various technical viewpoints (i.e. objective, application, structure, material, manufacturing process, processing and operation method, and control means).

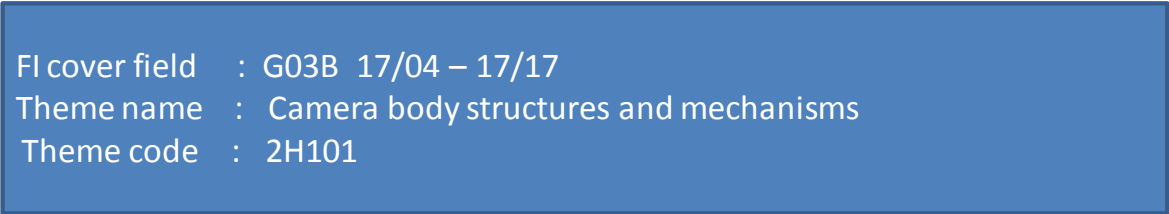
In the past, before the search system was established and when paper files were used for patent searches, examiners in charge used to recombine paper files, copy published unexamined patent applications and create new files from new perspectives to maintain and control data for prior art investigation. The F-term search system is a breakthrough which overcomes the limitation of such searches using paper files. It creates and recombines computerized virtual files (a set of documents to be screened) whenever necessary by recombining the F-terms. The F-term system, in contrast to the IPC and the FI, assumes that multiple F-terms are used in combination. In most cases, it creates “virtual files” using logical products of multiple F-terms to narrow down the documents to be screened. This narrows down the number of prior art documents concerned to an acceptable number (dozens or hundreds, depending upon the technical field).

As of 2010, F-terms have been introduced to about 70% of all technical fields. Each year, the F-term list is reviewed to respond to changes in technological trends and the increasing number of accumulated documents in many fields as necessary.

F-terms are provided for each of the technical ranges classified according to the FI. The technical ranges thus classified are called “themes”. The technical range of themes classified according to the FI is called the “FI cover field (FI coverage)” of the theme. A “theme name” that simply expresses the content of the technical range and a “theme code” that consists of five alphanumeric digits are applied to each theme. (Refer to Fig. 13.)

As of 2010, all technical fields are classified into about 2,600 themes, and F-terms are created for 1,800 of these (about 70%). The F-terms are used in patent searches as search keys with which to search domestic patent documents. Note that the themes for which F-term lists are available are called “F-term themes”, and those for which lists are not available are called “FI themes”.

Fig. 13



FI cover field : G03B 17/04 – 17/17
Theme name : Camera body structures and mechanisms
Theme code : 2H101

At the start of developing the F-term search system, the themes were created with the size of classification units as large as that of the IPC main groups. Later, they were further divided as the number of accumulated documents increased in some technical fields, or integrated into larger units due to performance improvements of the search system or changes in technological trends within other fields.

The list presenting the FI cover field, theme name, theme code, and the F-term is called the “F-term list”. An example of the F-term list is shown in Fig. 14.

Fig. 14 is a copy of the search terminal screen displaying the F-term list of the theme code “2H101”. Note, however, that this screen shows only a part of the F-term list, not the entire list. The rest of the F-term list can be displayed by scrolling the screen.

There are some themes to which extremely numerous viewpoints are assigned, and many F-terms are assigned to each viewpoint as shown in the example in Fig. 14. In patent searches, the F-terms are selected by referring to the F-term list as shown below. To select appropriate F-terms, it is important to carefully read the F-term list of the theme beforehand to get a grasp of all the F-terms contained.

Fig. 14

http://www5.ipdl.inpit.go.jp - PMGS/FTERM (TERM_LIST) - Microsoft Internet Explorer

ファイル(F) 編集(E) 表示(V) お気に入り(A) ツール(T) ヘルプ(H)

戻る 進む 印刷 検索 お気に入り リンク

MENU

HELP

TOP

BACK

NEXT

** F-term List **

2H101

Camera body structures and mechanisms

G03B17/04-17/17

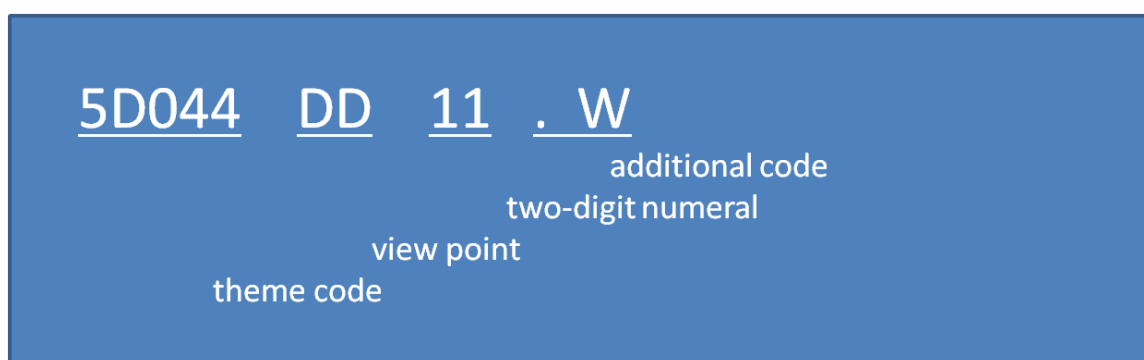
Viewpoint	F-term											FI Cover Range		
AA	AA00	AA01	AA02	AA03	AA04	AA05	AA06	AA07	AA08	AA09		G03B17/04-17/17		
	SIMPLE CAMERAS	Disposable cameras	Disposable-camera exteriors	Optical shielding	Film feeding	Film-winding mechanisms	Flatness of film in the image-pickup position	Lens holding	Removal of exposed film	Assembly				
		AAI1	AAI2	AAI3	AAI4									
		Cameras that use film cartridges	Attachment and detachment of film cartridges from the main body	Removal of exposed film	Connection of the main body and the film cartridge									
	BB	BB00	BB01	BB02	BB03	BB04	BB05	BB06	BB07	BB08	BB09		BB10	
		CAMERAS WITH MAIN BODIES CAPABLE OF CHANGING SHAPE	Individual units stored in the camera body	Storage of finders or strobes	Cameras with lens-protection covers	Variants wherein a section of the external frame serves as the lens protection cover	Variants wherein a built-in barrier serves as the lens-protection cover	Variants wherein the lens-protection cover is an externally attached cover	Cameras with lens barrels that extend and retract	Connection to the camera functions	Release locking during extension or retraction of the lens barrel		Use of the motor for lens-barrel extension and retraction for additional purposes	
			BB11	BB12	BB13	BB14	BB15	BB16	BB17	BB18	BB19		BB20	
			Cameras with two-focal points	Camera cones that are folded by rotation	Instant cameras	Cameras with finder housings	Connection of the film surface to the optical axis of the lens	Perpendicular connections	Horizontal connections	Switching of the photographic optical path and the finder optical path	Instant cameras with characteristic member arrangements, structures, and material characteristics		Focal-point adjustment mechanisms	
		BB21												
			Instant cameras with characteristic optical systems											
BB31		BB32	BB33	BB34	BB35	BB36	BB37	BB38	BB39	BB40				
		Cameras with bellows	Foldable structures and shapes	Quality of materials and manufacturing methods	Support and drive structures	Rotation around a shaft	Springs	Arms	Motors	Diagonal levers	Linkline of functions that accompany opening and closing			
BB41		BB42	BB43	BB44	BB45	BB46		BB48	BB49	BB50				

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インターネット

As shown in Fig. 15, the F-term consists of “theme code (5-digit alphanumeric code)”, “viewpoint (2-digit alphabetical letter)”, and “two-digit numeral”. However, since theme codes are frequently presented separately, the “viewpoint (2-digit alphabetical letter)” and the “two-digit numeral”, with the preceding 5-digit theme code omitted, are often referred to as “F-term”. The “viewpoint” here means the concept of coordinating multiple F-terms to be developed through it, which generally includes “objective”, “function”, “structure”, “material”, “application”, and “manufacturing process”.

Fig. 15



Furthermore, an “additional code” consisting of a single alphabetical letter is applied to some of the themes. The additional code supplements the F-term and is presented by a period “.” appended to the end of the F-term. The additional code adds information from viewpoints different from those of the F-term that are independently presented. Information is added that is linked to each F-term to which it is applied. As of 2010, the additional codes are used in more than 70 themes.

7. Search Examples Using FI and F-term

A query of F-term “analysis YES/NO” is set for each FI. When an “analysis YES” FI with a link to a theme is applied to a document, one of the F-terms contained in the F-term list of the theme is applied. “Analysis YES/NO” is determined by the presence of a hyperlink with the theme code available in the Patent Map Guidance System (PMGS) (refer to Fig. 16).

A theme whose F-term list is available is called an “F-term theme”, among which a theme containing an “analysis NO” FI is known as a “partial F theme”.

Regarding the “partial F theme”, the “FI cover field” of the theme is different from the range of the FI where the F-term is analyzed (i.e. “analysis-YES” FI). This should be noted when conducting searches using F-terms.

Fig. 16

Example of PMGS on display

27/02 . Viewing or reading apparatus	2H199	A link is included with the theme code
A Head-up displays	2H199	
B Film observation e.g.	2H199	
C Observation by reversing negative or positive films	2H199	
Z Others	2H199	
27/04 . . Having collapsible parts	2H199	No link is included with the theme code
27/06 . . With moving-picture effect	2H199	
27/08 . . Kaleidoscopes	2H199	
27/10 . Beam splitting or combining systems	2H199	
27/12 .. Operating by refraction only	2H199	

In conducting searches using F-terms, it is important to understand the structure of viewpoints. The methods for setting viewpoints differ depending upon technical fields (themes), but they can be categorized into the following three typical types.

The first type, type 1, is used in such technical fields as machines, commodities, and electric parts, where features of inventions are simply categorized into an appropriate number of groups. In these fields, features of inventions are categorized and the categorized technical viewpoints are compiled into F-terms and viewpoints to create F-term lists. The method is similar to brainstorming, for example, where ideas are written down on small pieces of paper, and then categorized into groups after a sufficient number have been accumulated.

To select F-terms using the type-1 F-term lists thus created, the contents of inventions described in patent gazettes are referred to first. Then, when feature b2 is found under viewpoint B through the reference, the F-term b2 is selected. Similarly, when feature d3 is found under viewpoint d3, the F-term d3 is selected.

By conducting searches in this manner, F-terms are selected according to features of interest. For example, when a search for feature b2 is desired, the search is conducted by selecting the F-term b2, and when a search for feature d3 is desired, the search is conducted by selecting the F-term d3. Thus, searches are mainly conducted using a single F-term.

If viewpoints B and D are technically correlated to each other, searches will be conducted using the logical product of the F-term b2 and the F-term d3.

Since F-term lists of this type tend to be segmented by a single viewpoint, the ranges to which the FI is applied will often vary depending on the viewpoints used.

The second type, type 2, presents features of inventions with a combination of multiple technical elements (including structure, function, elements used, and material). It is used in such technical fields as composition and control, where numerous groups would be generated if features were categorized as in type 1. In these fields, the F-term lists are designed to represent features of inventions by combining multiple technical elements. For this purpose, the viewpoints to correspond to multiple technical elements are established to select F-terms, and combinations thereof are used to represent the features of inventions.

To select F-terms using the type-1 F-term lists thus created, the contents of inventions described in patent gazettes are referred to first. Then, through the reference, when the features are found to be represented by a combination of a2 x b1 x c2 x d3, the F-terms a2, b1, c2 and d3 are applied.

Thus, in general practice, a search is first conducted using the logical product of the F-term a2 x b1 x c2 x d3 as a search formula, focusing on the features of interest. If the search formula fails to find appropriate prior art documents, the formula is corrected (by replacing it with a2 x b1 x c2, for example) to expand the search area. The F-term lists of type 2 make best use of the characteristics of the search index system from multiple points of view. They are characterized by using combinations of F-terms as a controlled term, and as a sort of “concept of controlled technical elements”.

Lastly, the third type, type 3, is a combination of type 1 and type 2. The technical fields suitable for type 1 are not always clearly distinguishable from those suitable for type 2. As a result, technical fields feature intermediate or mixed characteristics of the two. In such technical fields, both search styles are applied: one using the F-term list of type 1, and the other using the F-term list of type 2. Consequently, the ranges to which the FI is applied will often vary depending on the viewpoints used, as seen in the F-term lists of type 1.

A search example is given below, wherein a search using F-terms is explained and a search example using a model case is introduced.

The F-term classification system is characterized by its ability to classify prior art documents from multiple technical points of view, which are different from those used in the FI. The system uses multiple F-terms together (or logical products created) so as to narrow down the number of prior art documents, providing efficient searches.

Here, a model case is used to explain how to search the F-terms for use in the retrieval, and the method of retrieval using those F-terms.

Claimed invention (Model case)

[Title of the invention] Fiberscope

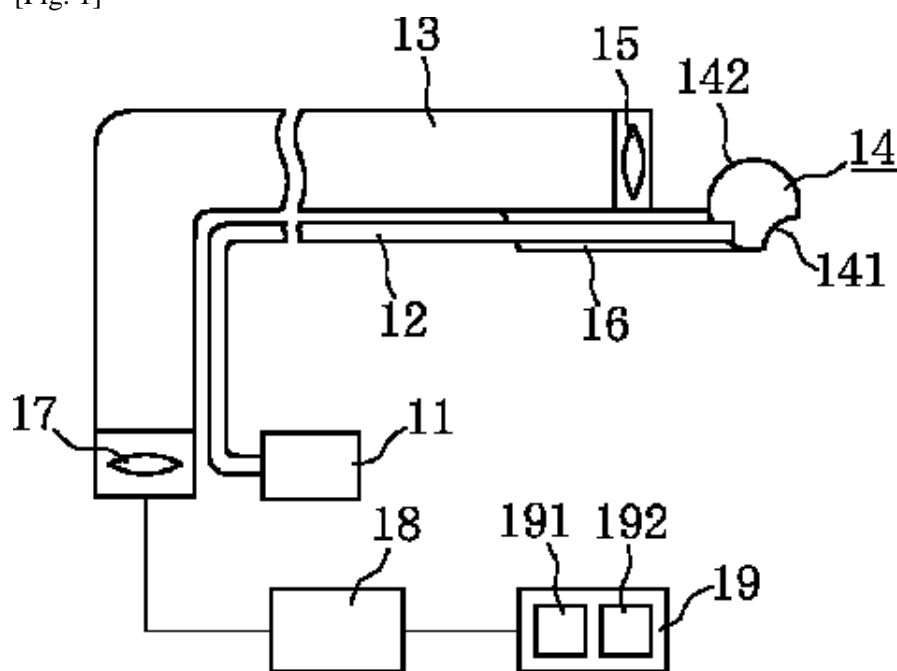
[Scope of claims]

[Claim 1] A fiberscope (1) comprising: an image guide (13) consisting of optical fiber bundles to transfer images; an objective lens (15) provided at one end of said image guide; and a camera (17) provided at the other end of said image guide, wherein said fiberscope is characterized by further comprising a curved mirror (142) placed in front of said objective lens to direct wide-angle images to enter said objective lens

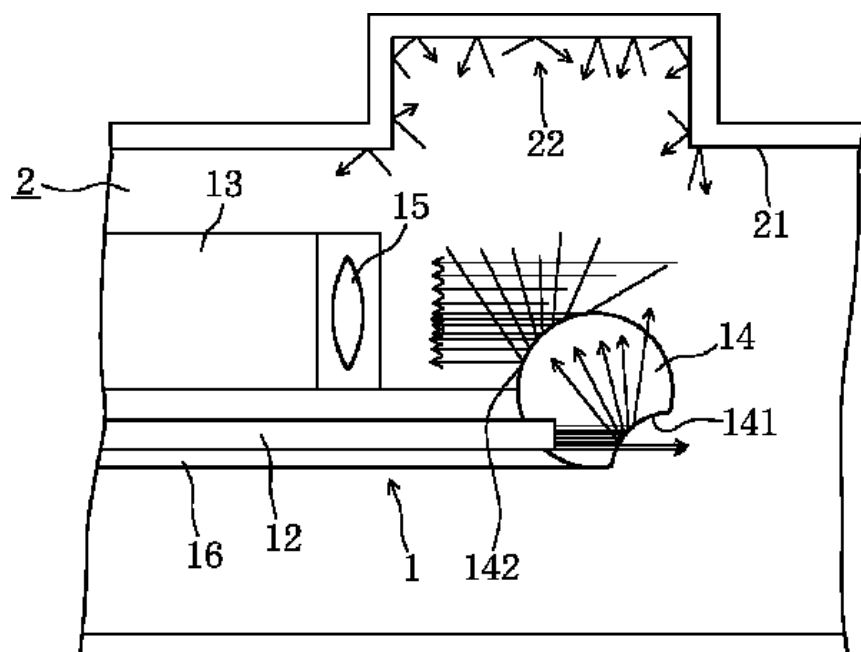
[Claim 2] A fiberscope according to claim 1 wherein said fiberscope is characterized by further comprising: a light guide (12) consisting of optical fibers to illuminate a subject (2); and a second curved mirror (141) placed on the output terminal side of said light guide to provide wide-angle illumination for the subject.

[Purpose] The purpose of the invention is to provide a fiberscope with which to detect internal defects inside the pipe by simultaneously viewing the internal status of the pipe both in the axial and the diameter direction.

[Fig. 1]



[Fig. 2]



Method for searching F-terms corresponding to constituent features of the claimed invention

As described in “4. Basic Flow of Patent Search”, the claimed invention is broken down into constituents, which are further divided into important constituents (features) and those corresponding to general art. Focusing on the features and the purpose of the invention, the F-terms corresponding to them are then selected, and the selected F-terms multiplied.

When the scope of claims above is broken down into constituents, the results as shown below are obtained:

Claim 1:

- (A) An image guide consisting of optical fiber bundles to transmit images
- (B) An objective lens placed on one end of the image guide
- (C) A camera placed on the other end of the image guide
- (D) A first curved mirror placed in front of the objective lens to direct wide-angle images to enter the objective lens
- (E) A fiberscope

Claim 2:

- (F) A light guide consisting of optical fibers to illuminate the subject
- (G) A second curved mirror placed on the output terminal side of the light guide to provide wide-angle illumination for the subject
- (H) A fiberscope according to claim 1

When a search is conducted, the theme code corresponding to the technique used in the claimed invention should be selected. The theme code is obtained by entering the IPC code corresponding to the claimed invention on the patent map guidance screen as shown in Fig. 17.

Here, the IPC code G02B23/24 applied to the claimed invention represents “Instruments for viewing the inside of hollow bodies, e.g. fiberscopes”. Thus the theme code “2H040 Instruments for viewing the inside of hollow bodies” is obtained.

The obtained F-term list of 2H040 is shown in Fig. 18 and Fig. 19.

Here, focusing on “BA02”, “BA12”, “CA12”, “CA22” and “GA01”, the constituents and the F terms correspond to each other as shown below:

Claim 1:

- (A) An image guide consisting of optical fiber bundles to transmit images
- (B) An objective lens placed on one end of the image guide → CA22
- (C) A camera placed on the other end of the image guide → GA01
- (D) A first curved mirror ... wide-angle images ... → BA02, CA22
- (E) Fiberscope

Claim 2:

(F) A light guide consisting of optical fibers to illuminate the subject

(G) A second curved mirror placed on the output terminal side of the light guide to provide wide-angle illumination for the subject → BA12, CA12

(H) A fiberscope according to claim 1

Fig. 17

PMGS - Microsoft Internet Explorer

ファイル(E) 編集(E) 表示(V) お気に入り(A) ツール(T) ヘルプ(H)

戻る 進む 検索 お気に入り 移動 リンク

アドレス(D) http://www5.ipdl.inpit.go.jp/pmes1/pmes1/pmes_E

Patent Map Guidance

MENU NEWS HELP

• Inquiry
Click "FI" or "F-term". Or input FI / F-term code to the query box and click Search button.

Query Search Object

• FI Search
e.g. : A61K A61K6 C08L27/06 A61K7/46@A A61K7/46,315@A

• F-term Search ☒ F-term List ☐ F-term Description
e.g. : 2B 2B396

Indication type selection is effective in the lower hierarchies than the FI main group.

Indication Type ☒ List ☐ Target ☐ The same hierarchy

• IPC-FI Concordance Search
Input IPC code to the query box and click Search button.

Query

IPC code Search
e.g. : A61K A61K6 A61K6/02 A01N25+B01B

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Next, the search formula is determined. In other words, a determination is made regarding the way in which the F-terms are selected, and how those F-terms are multiplied. In the conceptual diagram shown below, the prior arts supporting all of the constituents A through H above are represented by the intersection (product set) of the sets of F-terms corresponding to each constituent.

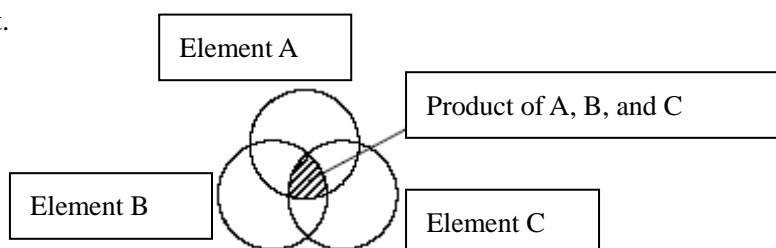


Fig. 18

PMGS/FTERM (TERM_LIST) - Microsoft Internet Explorer

ファイル(F) 編集(E) 表示(V) お気に入り(A) ツール(T) ヘルプ(H)

戻る 進む 印刷 検索 お気に入り

アドレス(D)

2H040

Instruments for viewing the inside of hollow bodies

G02B23/24-23/26

Viewpoint

F-term

FI Cover Range

G02B23/24-23/26

AA

AA00

USE OF INSTRUMENTS FOR VIEWING THE INSIDE OF HOLLOW BODIES

AA01

Industrial uses

AA02

Examination of the inner surface of tubes

AA03

Examination of the inside of containers

AA04

Use in a high or low temperature atmosphere

AA05

Use in a radioactive atmosphere

BA

BA00

OBJECTIVES AND FUNCTIONS OF INSTRUMENTS FOR VIEWING THE INSIDE OF HOLLOW BODIES

BA01

Optical functions

BA02

Wide-angle viewing

BA03

Variable magnification

BA04

Variable line of sight

BA05

Focusing adjustment

BA06

Auto-focus adjustment

BA07

Diopter adjustment

BA08

Prevention of Moire

BA09

Adjustment of illumination light

BA10

Adjustment of light intensity

BA11

Light adjust control

BA12

Adjustment of lighting span

BA13

Adjustment of light distribution conditions

BA14

Securing of visual field

BA15

Three-dimensional vision

BA21

Maneuvering by curving

BA22

Measurement of length or distance

BA23

Sensor functions

BA24

Waterproofing, dehumidifying, and air-tight sealing

CA

CA00

OPTICAL SYSTEM OF OBSERVATION APPARATUS

CA01

Optical systems for illumination

CA02

Illuminating light source

CA03

Illuminating light source on objective end

CA04

Optical systems with light source

CA05

Cooling means

CA06

Light emission control for light source

CA07

Connection between light guide and light source

CA08

Electric connections

CA09

Incident light into light guide

CA10

Control of incident light into light guide

CA11

Light guides

CA12

Optical systems of illuminating light source on objective end

CA13

Supplemental lighting for observation apparatus

CA21

Viewing optical systems

CA22

Objective optical systems

CA23

Objective lens

CA24

Prisms

CA25

Mirrors

CA26

Image transmission optical systems

CA27

Image guides

CA28

Relay lenses

CA29

Ocular optical systems

CA30

Eyepieces

DA

DA00

STRUCTURE OF OBSERVATION APPARATUS

DA01

Main bodies

DA02

Rigid endoscopes

DA03

Flexible endoscopes

DA11

Insertion sections

DA12

Objective ends

DA13

Cover glass

DA14

Curved tubes

DA15

Flexible tubes

DA16

Protective sheaths, covers, and the like on the observation apparatus

DA17

Internal structure of the observation apparatus

DA18

Arrangement of inner devices

DA19

Guide wires

DA21

Operation section

DA22

Control of peripheral equipment on the observation apparatus

DA31

Eyepiece unit of observation apparatus

DA32

Connection of eyepiece unit with optical equipment

DA33

Rotary connecting mechanisms

DA34

Non-rotary connecting mechanisms

DA35

Locking mechanism for connecting mechanisms

DA36

Electrical connection to optical equipment

DA41

Driving unit of observation apparatus

DA42

Electrically driven types

DA43

Electric drive control

DA51

Top end

DA52

Multi-

DA53

Insertion

DA54

Insertion

DA55

Water

インターネット

Fig. 19

PMGS/TERM (TERM LIST) - Microsoft Internet Explorer										
<div> <div> <div>戻る</div> <div>進む</div> <div>印刷</div> <div>お気に入り</div> <div>検索</div> <div>お気に入り</div> <div>アドレス</div> </div> <div> <div>ファイル(F)</div> <div>編集(E)</div> <div>表示(V)</div> <div>お気に入り(A)</div> <div>ツール(T)</div> <div>ヘルプ(H)</div> </div> </div>										
SYSTEM OF OBSERVATION APPARATUS	Optical systems for illumination	Light source	Illuminating light source on objective end	Optical systems with light source	Means	Light emission control for light source	Connection between light guide and light source	Connections	Incident light into light guide	Of incident light into light guide
	DA11	DA12	DA13							
	Light guides	Optical systems of illuminating light source on objective end	Supplemental lighting for observation apparatus							
	DA21	DA22	DA23	DA24	DA25	DA26	DA27	DA28	DA29	DA30
	Viewing optical systems	Objective optical systems	Objective lens	Prisms	Mirrors	Image transmission optical systems	Image guides	Relay lenses	Ocular optical systems	Eyepieces
	DA40	DA41	DA42	DA43						
	Main bodies	Rigid endoscopes	Flexible endoscopes							
	DA11	DA12	DA13	DA14	DA15	DA16	DA17	DA18	DA19	
	Insertion sections	Objective ends	Cover glass	Curved tubes	Flexible tubes	Protective sheaths, covers, and the like on the observation apparatus	Internal structure of the observation apparatus	Arrangement of inner devices	Guide wires	
	DA21	DA22								
DA	Operation section	Control of peripheral equipment on the observation apparatus								
	DA31	DA32	DA33	DA34	DA35	DA36				
	Eyepiece unit of observation apparatus	Connection of eyepiece unit with optical equipment	Rotary connecting mechanisms	Non-rotary connecting mechanisms	Locking mechanism for connecting mechanisms	Electrical connection to optical equipment				
	DA41	DA42	DA43							
	Driving unit of observation apparatus	Electrically driven types	Electric drive control							
	DA51	DA52	DA53	DA54	DA55	DA56	DA57			
	Attachments to observation apparatus	Top end optical adapters	Multi-viewer units	Insertion guides	Insertion guides equipped with traveling unit	Disposition tools	Water feeding, air feeding, and suction attachments			
	EA00	EA01	EA02							
	Cleaning	Storage								
	EA00	EA01	EA02							
RELATED APPARATUS FOR OBSERVATION APPARATUS	EA00	EA01	EA02							
	Cleaning	Storage								
	EA00	EA01	EA02							
	Cleaning	Storage								
	EA00	EA01	EA02							
	Cleaning	Storage								
	EA00	EA01	EA02							
	Cleaning	Storage								
	EA00	EA01	EA02							
	Cleaning	Storage								
FA	FA00	FA01	FA02	FA03	FA04	FA05	FA06	FA07	FA08	FA09
	Camera-on-the-top apparatuses	Optical system for photographing	Shutter releases	Film handling	Motor-driven	Indication of photographic information	Data insertion onto images	Light sources for photographing	Switching-over of light source	Photographic control
	FA11	FA12	FA13	FA14	FA15					
	Exposure control	Photometry means	Transmission and control of photographing signals	Digital control	Holographic photographing					
	GA00	GA01	GA02	GA03	GA04	GA05	GA06	GA07	GA08	GA09
	Externally mounted imaging cameras	Incorporation of imaging elements	Mounting and positioning of image pick-up device	Cooling and protecting of image pick-up device	Color image pick-up systems	Picture quality adjustment	Contrast adjustment	Blooming prevention	Prevention of smear	Image recording
	GA11	GA12								
	Image displaying	Still picture displaying								
	GA00	GA01	GA02	GA03	GA04	GA05	GA06	GA07	GA08	GA09
	Externally mounted imaging cameras	Incorporation of imaging elements	Mounting and positioning of image pick-up device	Cooling and protecting of image pick-up device	Color image pick-up systems	Picture quality adjustment	Contrast adjustment	Blooming prevention	Prevention of smear	Image recording
GA	GA00	GA01	GA02	GA03	GA04	GA05	GA06	GA07	GA08	GA09
	Externally mounted imaging cameras	Incorporation of imaging elements	Mounting and positioning of image pick-up device	Cooling and protecting of image pick-up device	Color image pick-up systems	Picture quality adjustment	Contrast adjustment	Blooming prevention	Prevention of smear	Image recording
	GA11	GA12								
	Image displaying	Still picture displaying								
	GA00	GA01	GA02	GA03	GA04	GA05	GA06	GA07	GA08	GA09
	Externally mounted imaging cameras	Incorporation of imaging elements	Mounting and positioning of image pick-up device	Cooling and protecting of image pick-up device	Color image pick-up systems	Picture quality adjustment	Contrast adjustment	Blooming prevention	Prevention of smear	Image recording
	GA11	GA12								
	Image displaying	Still picture displaying								
	GA00	GA01	GA02	GA03	GA04	GA05	GA06	GA07	GA08	GA09
	Externally mounted imaging cameras	Incorporation of imaging elements	Mounting and positioning of image pick-up device	Cooling and protecting of image pick-up device	Color image pick-up systems	Picture quality adjustment	Contrast adjustment	Blooming prevention	Prevention of smear	Image recording

Therefore, to search the prior arts supporting all of the constituents A through H of the claimed invention, the following formula including all the F-terms “BA02”, “BA12”, “CA12”, “CA22” and “GA01” is created:

Formula (1): BA02*BA12*CA12*CA22*GA01

If formula (1) fails to find any documents of appropriate prior art inventions, the search area should be expanded. However, the search area needs to be expanded carefully in order to conduct an efficient search.

In general, since all constituents of claimed inventions are not equal in the degree of importance in a search, they are divided into those that greatly affect the implementation of desired purposes or effects—that is, the principal parts—and others. Therefore, an effective way to expand the search area is to leave the F-terms corresponding to the principal parts of the invention in the formula, while trying to remove others. It is also effective to replace selected F-terms with those of a generic concept.

For example, when a search is conducted wherein it is assumed that “BA02” and “CA22” are the principal parts, and that “GA01” is so specific that it should be replaced with a more generic concept, the results included search formulae in the following order:

Formula (1): BA02*BA12*CA12*CA22*GA01; Number extracted (0)

(GA01 is replaced with a more generic concept GA00)

Formula (2): BA02*BA12*CA12*CA22*GA00; Number extracted (1)

“BA121” is eliminated)

Formula (3): BA02* CA12*CA22*GA00; Number extracted (3)

“CA12” is eliminated and “BA12” is entered.)

Formula (4): BA02*BA12* CA22*GA00; Number extracted (5)

(“BA12” is also eliminated.)

Formula (5): BA02* CA22*GA00; Number extracted (24)

(“GA00” is also eliminated.)

Formula (6): BA02* CA22 ; Number extracted (121)

Thus, screening of the extracted prior art documents successfully identified the prior art documents that will be useful in assessing novelty and inventive step.

In addition, screening can be conducted in duplicate when applications that have been screened and extracted by a previous search formula are again extracted by a second search formula. This will needlessly increase the search load, especially when a large number of documents are extracted. Therefore, it is recommended to devise formulae that will eliminate the previous ones, by replacing formulae (5) and (6) with the following formulae, for example:

Formula (5'): BA02*CA22*GA00 – Formula (4)

Formula (6'): BA02*CA22 – Formula (5)

In practice, the formulae below are created:

Formula (5'): BA02*CA22*GA00 – [BA02*BA12*CA22*GA00]

Formula (6'): BA02*CA22 – [BA02*CA22*GA00]

These formulae successfully reduce the number of extracted documents to 13 and 97, respectively, resulting in a reduction in the burden of screening.

8. Search Examples in the Field of Optical Instruments

As explained in “2. Fields of Optical Instruments”, the technologies classified in the fields of optical instruments are so diverse that it is difficult to plainly explain the specific search methods that can be commonly shared in searches using FI and F-terms in all fields into which these technologies are classified. Here, several search examples are introduced using examples of typical technologies classified in some of the fields. Each search example is specifically examined to explain the search method applicable to the fields of optical instruments.

Example 1: Patent Application: 2007-025364 Filed on Feb. 5, 2007) (Unexamined Patent Application: 2008-191374)

[FI]G02B 6/44 381[Reference F-terms]2H001 BB09, BB10, DD04, DD09, DD24, KK06, KK08, KK17, KK22, PP01

[Title of the invention] Optical fiber cable

[Scope of claims]

[Claim 1]

An optical fiber cable comprising: a slot featuring optical fiber storing grooves on the outer periphery; optical fibers stored in the said optical fiber storing grooves; an intermediate layer covering the said slot and featuring a water-stopping effect; a pressure tape composed of a polyolefin resin spirally wound on the said intermediate layer; and a sheath composed of polyolefin resin extrusion-coated on the said pressure tape; wherein the pressure tape and the sheath are bonded to each other, and the intermediate layer is provided, on the outer surface, with a layer having a mold-releasing effect relative to the pressure tape and the sheath.

[Claim 2]

An optical fiber cable according to claim 1, wherein two or more pressure tapes are spirally wound around at approximately regular intervals on the said intermediate layer, and the winding pitch angle θ of each pressure tape is not less than 25 degrees

[Claim 3]

An optical fiber cable according to claim 2, wherein the winding intervals of each said pressure tape are between 7 mm and 15 mm

[Claim 4]

An optical fiber cable according to any one of claims 1 through 3, wherein the coefficient of

thermal contraction in a longitudinal direction is 15% or less when heated at 100°C for 30 minutes with a load of 100 g added

[Claim 5]

An optical fiber cable according to any one of claims 1 through 4, wherein the said pressure tape and the said sheath are both composed of polyethylene resin

[Claim 6]

An optical fiber cable according to any one of claims 1 through 5, wherein an intermediate layer is composed of longitudinal lapping of tape-shaped water stops

[Claim 7]

An optical fiber cable according to claim 6, wherein the overlapping portions at both edges of the water stop are not adhered

[Abstract]

[Problem] To provide an optical fiber cable that excels in recyclability

[Means for solving the problem] An optical fiber cable comprising: a slot 10 having optical fiber storing grooves 11 on the outer periphery; coated optical fibers 12 stored in the optical fiber storing grooves 11; an intermediate layer 14 covering the slot 10 and having a water-stopping effect; a pressure tape 15 composed of polyolefin resin spirally wound on the intermediate layer 14; and a sheath 16 composed of polyolefin resin extrusion-coated on the pressure tape 15, wherein the pressure tape 15 and the sheath 16 are bonded to each other, and the intermediate layer 14 is provided, on the outer surface, with a layer having a mold-releasing effect relative to the pressure tape 15 and the sheath 16.

[Detailed description of the invention] (Partial excerpt)

[Technical field]

[0001]

The present invention relates to an optical fiber cable of a slot type, or more specifically, to an optical fiber cable provided with an intermediate layer covering the slot and featuring a water-stopping effect.

[Background art]

[0002]

Generally, an optical fiber cable of a slot type is provided with a slot, on the outer periphery of which is provided two or more grooves in which coated optical fibers are stored, wherein the outer periphery of the slot is provided with an intermediate layer featuring a water-stopping effect in order to prevent water from penetrating into the inside of the grooves, and the periphery of the intermediate layer is provided with a sheath. The intermediate layer is formed by longitudinal or latitudinal lapping of a tape-shaped water-stopping material, which is composed of a base material made of woven or nonwoven fabrics on which a water-absorbing resin layer is formed around the slot. When the intermediate layer is formed by latitudinal lapping of the tape-shaped water-stopping material, a pressure tape is usually provided on the intermediate layer.

[0003]

Meanwhile, with the growing attention on global environmental protection in recent years, the need for recycling industrial waste is increasing, and electric wires and cables are increasingly recycled, as are home electric appliances and automotive parts.

[0004]

In such circumstances, the above-mentioned optical fiber cables, which use non-cross-linked polyolefin resin (commonly, non-cross-linked polyethylene) as materials for the slot and sheath, are expected to be highly recyclable electric wires and cables. In other words, since the slot and the sheath that account for a relatively large volume of the cable constituents are composed of non-cross-linked polyolefin resin that needs no heat treatment at high temperature, they are considered to be highly efficient recyclable materials.

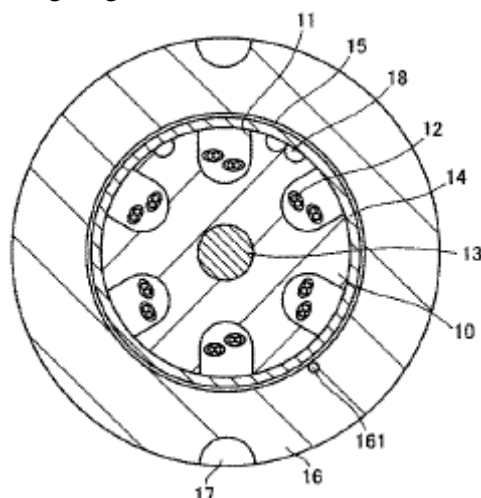
[0005]

A problem exists with the abovementioned optical fiber cable provided with a sheath, however, under which an intermediate layer is provided. Since the intermediate layer is composed of a tape-shaped water-stopping material consisting of a base material made of woven or nonwoven fabrics on which a water-absorbing resin layer is formed, the sheath is difficult to strip off, and even when successfully stripped off, fibers (constituents of the intermediate layer) will adhere to the sheath and mix with the recycled sheath material as contaminants. This results because when the intermediate layer is covered with the sheath composed of low density polyethylene resin, for example, the resin is heated to a temperature between approximately 150°C and 190°C, which is the molding temperature of low density polyethylene resin, and is extruded to coat the intermediate layer surface. In this process, the melted low density polyethylene resin will enter the gaps between the fibers of the base material of the water-stopping material, causing the fibers and the sheath to firmly adhere to each other.

[0006]

Moreover, when the intermediate layer is formed by latitudinal lapping of the tape-shaped water-stopping material, a part of the intermediate layer is cut to unravel it by reversing the lapping process. This takes a lot of time and work. Furthermore, when the intermediate layer was composed of latitudinal lapping of the tape-shaped water-stopping material, with a pressure tape provided, it was difficult to cut and remove it depending on the material and shape of the pressure tape, and there is a potential risk of the tape materials contaminating the recyclable sheath materials.

[Chosen drawing] Fig. 1



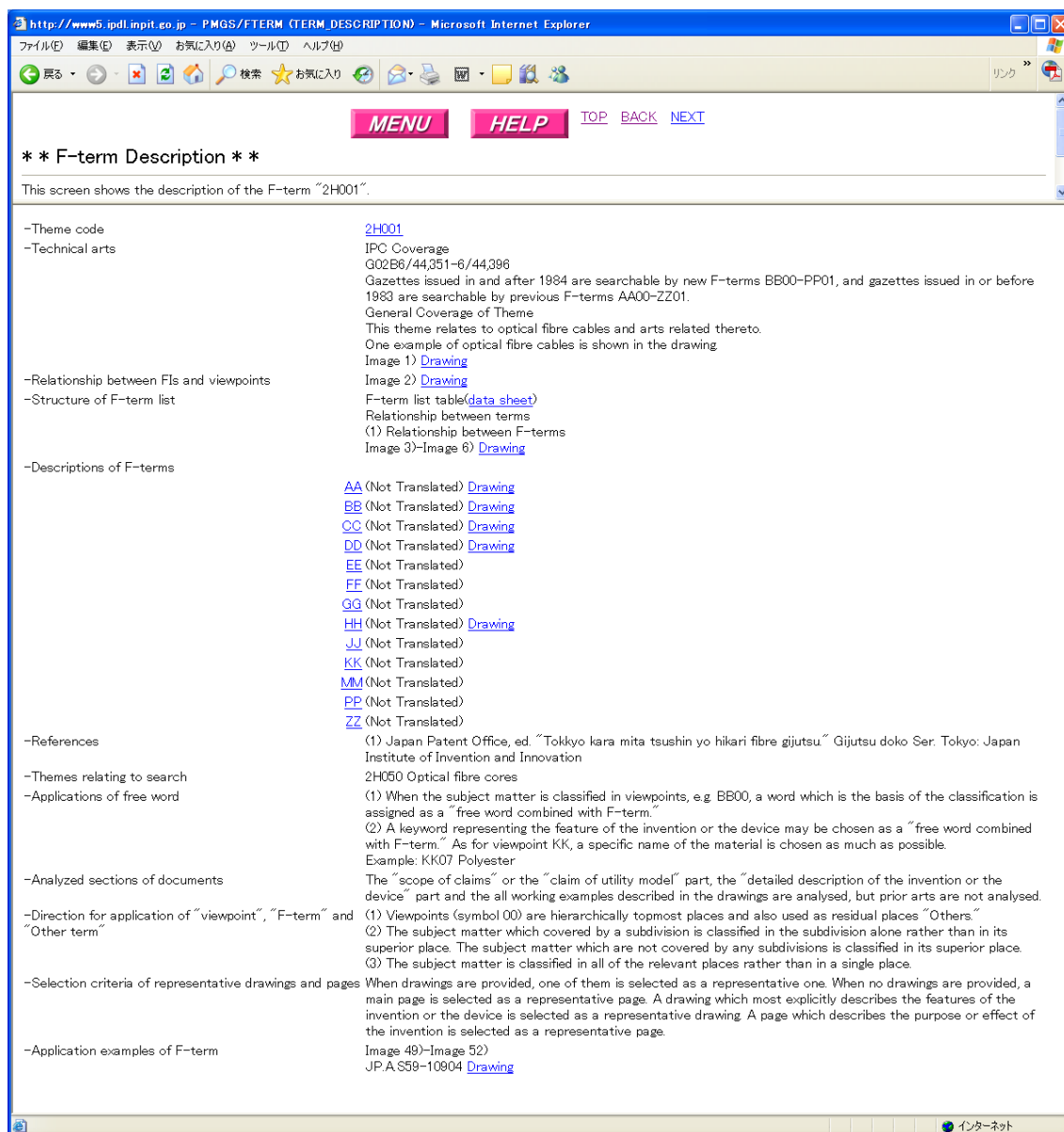
- The claimed invention pertains to an optical fiber cable, and according to the FI and the theme code applied in the published unexamined patent application, the F-term theme code 2H001 corresponding to the invention is determined. The F-terms are then selected among those under 2H001. In selecting F-terms, one should be precisely understood. For this purpose, enter “2H001” in the F-term query box on the Patent Map Guidance screen as shown in Fig. 17 while checking the “F-term description” box instead of the “F-term list” box, and click the “search” button. This will show the description of the F-term 2H001 as shown in Fig. 20.

This F-term description includes the following: corresponding FI cover field (FI coverage), relationship between FIs and viewpoints, references, information on applications of free words, direction for application of F-terms, selection criteria of representative drawings, and descriptions of F-terms. The F-term description in the English version does not include a description of viewpoints such as AA and BB. However, when AA, BB, or other viewpoints are clicked, a list of detailed descriptions of F-term viewpoints such as AA00 and AA01 will be displayed. Thus, the list provides a good understanding of each F-term, even if a full understanding of the viewpoints is not attained.

Next, obtain the F-term list as shown in Fig. 21 and select the F-terms to search prior arts of the claimed invention while referring to the corresponding F-term list,. The F-term list is obtained either by entering “2H001” in the F-term query box on the Patent Map Guidance screen as shown in Fig. 17, selecting “F-term description” at the same time, and clicking the “search” button; or by clicking the “F-term list table (datasheet)” given in the F-term description as shown in Fig. 20. In addition, though the F-term viewpoints may be selected by referring to the detailed description of F-terms that includes AA00 and AA01 obtained by clicking AA, BB or other viewpoints as described above, a more balanced selection may be conducted by referring to the F-term list as shown in Fig. 21 that provides a perspective view of all F-terms for the theme concerned.

Lastly, referring to the F-terms corresponding to each constituent contained in claim 1 results in the following.

Fig. 20



Claim 1: An optical fiber cable with a layer comprising: a slot having optical fiber housing grooves (BB07) in an outer peripheral surface; an optical fiber (BB07) stored by the said optical fiber housing grooves; an intermediate layer (DD23) with a water-stopping effect (DD35) for the said slot; a pressure tape (DD23) composed of polyolefin resin (KK17) spirally wound on the said intermediate layer; wherein the pressure tape and the sheath are bonded to each other, and the intermediate layer is provided, on the outer surface, with a layer featuring a mold-releasing effect relative to the pressure tape and the sheath.

An explanation of other claims is omitted.

Fig. 21

http://www5.ipdl.inpit.go.jp - PMQS/FTERM (TERM_LIST) - Microsoft Internet Explorer

ファイル(E) 編集(E) 表示(V) お気に入り(A) ツール(T) ヘルプ(H)

戻る 進む 検索 お気に入り

MENU HELP TOP BACK NEXT

**** F-term List ****

2H001 Optical fibers G02B6/44,351-6/44,396		F-term										FI Cover Range G02B6/44,351-6/44,396
BB	BB00 OPTICAL FIBRE UNITS	BB01 Round units	BB02 ... assembling optical fibres directly	BB03 ... bonding optical fibres to one another	BB04 ... bundling optical fibres to one another	BB05 ... having untwisted optical fibres to one another	BB06 ... embedded in a coating	BB07 ... held in grooved spacers	BB08 ... Linear grooves	BB09 ... Spiral grooves	BB10 ... Reversed spiral grooves or SZ grooves	
		BB11 ... holding optical fibres in assemblies consisting of U- or V-shaped spacers	BB12 ... holding optical fibres between linear members		BB14 Flat units	BB15 ... Single-sheet type	BB16 ... Multiple layered type		BB18 ... assembling optical fibres directly	BB19 ... embedding optical fibres in a coating	BB20 ... sandwiching optical fibres between tapes	
		BB21 Assemblies of units	BB22 ... having identification means	BB23 ... assembling optical fibres by rough winding		BB25 Longitudinal structures	BB26 Optical fibres having redundant lengths	BB27 ... for branching optical fibres	BB28 Installation structures			
DD	DD00 PROTECTIONS OR REINFORCEMENTS	DD01 Reinforcement wires	DD02 Arrangements of reinforcement wires	DD03 ... arranged on the inner side of the optical fibres	DD04 ... at the centre	DD05 ... between optical fibres	DD06 ... on the outer side of optical fibres	DD07 ... cylindrically arranged	DD08 Structures of reinforcement wires	DD09 Single wire	DD10 Bundled wires	
		DD11 Reinforcement wires with coating			DD14 Dampers	DD15 Wire-like materials	DD16 Granular materials	DD17 Liquid materials	DD18 Elastic materials	DD19 Foamed or porous materials		
		DD21 External protective layers	DD22 ... non-axisymmetric	DD23 ... having multilayered structures	DD24 ... having three or more layers	DD25 Longitudinal structures						
		DD31 Heat resistance	DD32 ... being flame-retardant			DD35 Water resistance	DD36 ... using swelling substances	DD37 ... using jelly				
FF	FF00 OTHER STRUCTURES	FF01 ... having conductors	FF02 ... having electric wires		FF04 ... having gas-dams		FF05 Cable terminations	FF07 ... having connecting means	FF08 Protection of ends			
HH	HH00 ACCESSORIES	HH01 Supports or fixtures for cables	HH02 ... having suspending wires									
KK	KK00 MATERIALS OF MEMBERS CONSTITUTING CABLES	KK01 Materials of optical fibres	KK02 ... Glass	KK03 ... Plastics		KK05 Materials of reinforcement wires	KK06 ... Metal	KK07 ... Plastics	KK08 ... FRP	KK09 ... Glass		
		KK11 Materials of spacers	KK12 ... Plastics	KK13 ... FRP	KK14 ... Metal		KK16 Materials of external protective layers exclusively for the outermost protective layer	KK17 ... Plastics	KK18 ... FRP	KK19 ... Metal	KK20 ... Rubber	
		KK21 Materials of external protective layers excluding the outermost protective layer	KK22 ... Plastics	KK23 ... FRP	KK24 ... Metal	KK25 ... Rubber	KK26 ... Glass					
MM	MM00 MANUFACTURING METHODS OR APPLICATIONS	MM01 Manufacturing methods	MM02 Manufacturing apparatuses		MM04 ... Paying-out of optical fibres or linear delivery	MM05 ... with optical fibres rotated	MM06 ... inserting optical fibres into tubes		MM08 Applications	MM09 ... applied as submarine cables	MM10 ... other than communication	
PP	PP00 OTHERS	PP01 Numerical designs, e.g. limiting numerical values										

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In principle, F-terms are selected based on the constituents described in claims, although in view of possible restrictions of the claim resulting from amendments by the applicant made after the notification of reason for refusal, they may sometimes be selected based on more specific matters described in embodiment claims. However, F-terms, when selected with too

much focus on specific matters can fail to extract prior arts with relatively similar content. In other words, F-terms featuring many dots, which are selected from lower places in the hierarchy that correspond to specific matters, can increase the number of prior arts that are not extracted through the search. By contrast, F-terms selected from upper places in the hierarchy can increase the number of prior arts extracted through the search, resulting in an excessive burden of screening. Therefore, it is desirable to select F-terms from appropriate places in the hierarchy. To do this, a certain level of search skill in the fields concerned is required. Here, the F-terms above were selected based on our experience, with these matters considered.

Next, the search formulae were created to search the F-terms. First of all, the following formula (1) was created and a search was conducted:

Formula (1): $BB07*DD23*DD35*KK17*KK22$

The number extracted was 55, and the screening failed to find useful prior art documents.

“DD35” was next eliminated from formula (1) to derive formula (2).

Formula (2): $BB07*DD23*KK17*KK22 - [BB07*DD23*DD35*KK17*KK22]$
 $= BB07*DD23*KK17*KK22 - [BB07*DD23*DD35*KK17*KK22]$

The number extracted was 83, and the screening failed to find useful prior art documents.

Then, “DD23” was eliminated from formula (2) to derive formula (3).

Formula (3): $BB07*KK17*KK22 - [BB07*DD23*KK17*KK22]$
 $= BB07*KK17*KK22 - [BB07*DD23*KK17*KK22]$

The number extracted was 82. As a result of the screening, a useful prior art document, the unexamined patent application 2006-258889 (publication 1), was successfully found.

Next, “DD23” in formula (2) was replaced with “DD21” in the upper hierarchy to derive formula (4).

Formula (4): $BB07*DD21*KK17*KK22 - [BB07*DD23*DD35*KK17*KK22]$
 $= BB07*DD21*KK17*KK22 - [BB07*DD23*DD35*KK17*KK22]$

The number extracted was 93, and the screening failed to find useful prior art documents.

Similarly, “KK22” was eliminated from formula (4) to derive formula (5).

Formula (5): $BB07*DD21*KK17 - [BB07*DD21*KK17*KK22]$
 $= BB07*DD21*KK17 - [BB07*DD21*KK17*KK22]$

The number extracted was 133, and the the screening failed to find useful prior art documents.

Then, “KK17” was eliminated from formula (4) to derive formula (6).

Formula (6): $BB07*DD21*KK22 - [BB07*DD21*KK17*KK22]$
 $= BB07*DD21*KK22 - [BB07*DD21*KK17*KK22]$

The number extracted was 142. As a result of the screening, a useful prior art document, the

unexamined patent application 2002-243999 (publication 2), was successfully found.

Publication 1: Unexamined Patent Application 2006-258889 Official Gazette
(Published on September 28, 2006)

[Title of the invention] Optical fiber cable

[Scope of claims]

[Claim 1]

An optical fiber cable comprising:

a slot featuring optical fiber storing grooves on the outer periphery;

optical fibers stored in the said optical fiber storing grooves;

an intermediate layer longitudinally wrapped around the said slot to cover the said slot;

a pressure tape spirally wound on the said intermediate layer at certain intervals; and

a sheath covering the said slot over the said pressure tape;

wherein the pressure tape and the sheath are bonded to each other.

[Claim 2]

The optical fiber cable according to claim 1, wherein the said sheath and the said pressure tape are composed of thermoplastic materials.

[Claim 3]

The optical fiber cable according to claim 1 or claim 2, wherein the said sheath and pressure tape are composed of the same materials.

[Claim 4]

The optical fiber cable according to any one of claims 1 through 3, wherein the said sheath and the said pressure tape are composed of polyethylene.

[Claim 5]

The optical fiber cable according to any one of claims 1 through 4, wherein the bonding strength between the said sheath and the said pressure tape is 0.5 N/mm or more.

[Claim 6]

The optical fiber cable according to any one of claims 1 through 5, wherein the said sheath and the pressure tape are so structured that when a part of the said sheath is cut using a knife while the said pressure tape remains intact, the said sheath will be ripped down longitudinally with one cut end of the said sheath grasped, while the said pressure tape will simultaneously be broken.

[Claim 7]

The optical fiber cable according to any one of claims 1 through 6, wherein the said pressure tape has a tensile breaking strength of 25 NT or less.

[Claim 8]

The optical fiber cable according to any one of claims 1 through 7, wherein the said slot is further provided with a second pressure tape between the said slot and the said

intermediate layer, and the second pressure tape is spirally wound at an interval around the said slot.

[Claim 9]

The optical fiber cable according to claim 8, wherein the said second pressure tape is wound around the said slot at an interval of 5 mm or more.

[Claim 10]

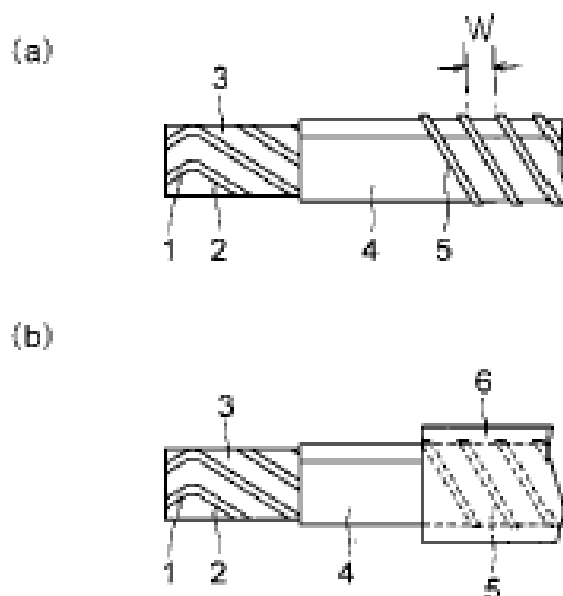
The optical fiber cable according to claim 8 or claim 9, wherein the coefficient of static friction between the said slot and the said second pressure tape is 0.5 or less.

[Abstract]

[Problem] To provide an optical fiber cable that can be disassembled more easily than the conventional one by adopting an intermediate layer longitudinally wrapped around the said slot.

[Means for solving the problem] The present claimed invention comprising a slot 3 having optical fiber storing grooves 2 on the outer periphery, an optical fiber 1 stored in the optical fiber storing grooves 2, an intermediate layer 4 which is longitudinally wrapped around the slot 3 to cover the slot 3, a pressure tape 5 spirally wound at an interval around the intermediate layer 4, and a sheath 6 covering the slot 3 over the pressure tape 5, is characterized in that the pressure tape 5 and the sheath 6 are bonded with each other.

[Chosen drawing] Fig. 2



Publication 2: Unexamined patent application 2002-243999 Official Gazette
(Published on August 28, 2002)

[Title of the invention] Optical fiber cable

[Scope of claims]

[Claim 1] An optical fiber cable comprising: a slot in the groove of which a plastic coated fiber is stored and on which is provided a water-stopping layer composed of a water-stopping material made of woven or non-woven fabrics based on which a water-absorbing layer is formed, and a sheath layer which further covers the slot over the water-stopping layer, wherein a fusion bonding preventive layer is provided between the said water-stopping layer and the sheath so as to prevent the water-stopping layer and the sheath layer from being fusion-bonded with each other.

[Claim 2] The optical fiber cable according to claim 1, wherein the base material of the water-stopping material is composed of nonwoven fabric made of polyester resin.

[Claim 3] The optical fiber cable according to either claim 1 or claim 2, wherein the sheath layer and the fusion bonding preventive layer are made of the same polyethylene.

[Claim 4] The optical fiber cable according to claim 3, wherein the sheath layer and the fusion bonding preventive layer are made of linear low density polyethylene (L-LDPE).

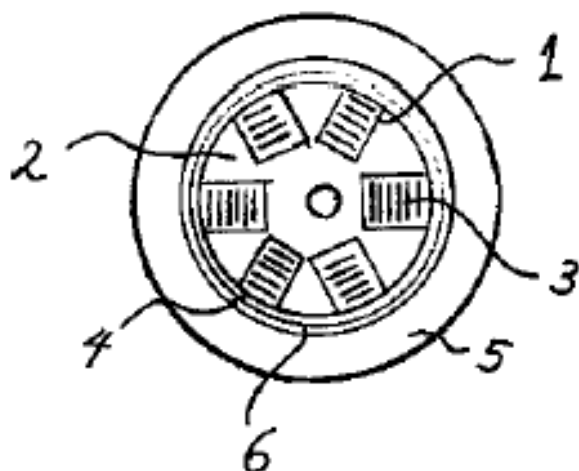
[Claim 5] The optical fiber cable according to either claim 3 or claim 4, wherein the fusion bonding preventive layer and the water-stopping layer are not fusion-bonded with each other while the sheath layer and the fusion bonding preventive layer are bonded with each other.

[Abstract]

[Problem] The present invention relates to an optical fiber cable, wherein the materials used for the sheath layer are easily recycled. The purpose of the present invention is to provide an optical fiber in which the water-stopping layer and the sheath layer are easily separated from each other to facilitate disassembling of the cable.

[Means for solving the problem] The problem above is solved by an optical fiber cable comprising a slot, in the groove of which a plastic coated fiber is stored, and on which is provided a water-stopping layer composed of a water-stopping material made of woven or non-woven fabrics, based on which a water-absorbing layer is formed, and a sheath layer which further covers the slot over the water-stopping layer, wherein a fusion bonding preventive layer is provided between the said water-stopping layer and the sheath so as to prevent the water-stopping layer and the sheath layer from being fusion-bonded with each other. Preferably, in particular, the sheath layer and the fusion bonding preventive layer should be made of linear low density polyethylene (L-LDPE).

[Chosen drawing] Fig. 1



Example 2: Patent Application 2005-354542 (Date of application: December 8, 2005)
(Unexamined Patent Application 2007-156295)

[FI] G02F 1/335, G02F 1/335 520, G02F 1/13357, G02F 1/13 505

[Reference F-terms] 2H088 EA13, EA20, EA23, HA25, HA28, MA04, MA06, MA20, 2H091, FA17X, FA29Z, FA45Z, FD06, FD12, LA17, LA18, LA30, MA03, MA07

[Title of the invention] Light emitting display device

[Scope of claims]

[Claim 1] A light emitting display device comprising a reflecting member which is placed obliquely with respect to the line of sight, and a liquid crystal display which is placed obliquely with respect to the line of sight reflected by the said reflecting member, wherein light is emitted from behind the said liquid crystal display by the backlight to direct the light from the image formed on the said crystal display to the said reflecting member, so that a virtual image recognized on the said reflecting member may be visually recognized on a surface perpendicular to the said line of sight, wherein the light emitting surface of the said back light is placed perpendicular to the line of sight reflected from the said reflecting member, and a focusing lens is provided between the said backlight and the said liquid crystal display to focus the light flux of the said illumination light in such a manner that the light flux of the said illumination light emitted from the said light emitting surface may stay within the range of the said liquid crystal display and, at the same time, the light flux of the said illumination light that is turned into image light of the said displayed image as it passes through the said liquid crystal display may stay within the range of the said reflecting member.

[Claim 2] The light emitting display device according to claim 1, wherein the said

focusing lens member is composed of multiple focusing lenses arrayed on a plane.

[Claim 3] The light emitting display device according to claim 2, wherein the said back light is composed of multiple point sources arrayed on a plane, and each said focusing lens is arranged so that its optical axis is aligned with that of the corresponding said point source.

[Abstract]

[Problem to be solved] To provide visual recognition of the virtual image of the image displayed on the liquid crystal display with sufficient and uniform brightness on the reflecting member by placing the liquid crystal display obliquely with respect to the line of sight reflected by the reflecting member, so as to efficiently utilize the illumination light from the backlight even when the liquid display is not placed in parallel with the reflecting member

[Means for solving the problem] The backlight 13 and the focusing lens member 15 are placed behind the liquid crystal display 11 which is placed slightly obliquely with respect to the line of sight "L" reflected by the concave mirror 3, so that they may be placed on a plane perpendicular to the line of sight "L" reflected by the concave mirror 3, wherein the luminous flux of the illumination light from the backlight 13 is focused by the focusing lens member 15 in such a manner that the luminous flux stays within the range of the liquid crystal display 11.

[Detailed description of the invention] (Partial excerpt)

[Technical field]

[0001]

The present invention relates to a light emitting display device, wherein the image light from the image displayed on the liquid crystal display is transmitted from the liquid crystal display as the backlight emitted from behind the liquid crystal display passes through it, and the image light is further reflected by the reflecting member, so that the image may be virtually recognized.

[Background art]

[0002]

For instance, a head-up display is used in vehicles to enable drivers to visually recognize virtual images formed from the images displayed on the liquid crystal display placed inside the dashboard, wherein the image light of the displayed images transmitted from the liquid crystal display placed inside the dashboard is reflected by the combiner placed on the windshield or on the driver side of the windshield, so that a variety of information overlapping the scenery ahead of the windshield may be visually recognized on the windshield or on the combiner by the driver.

[0003]

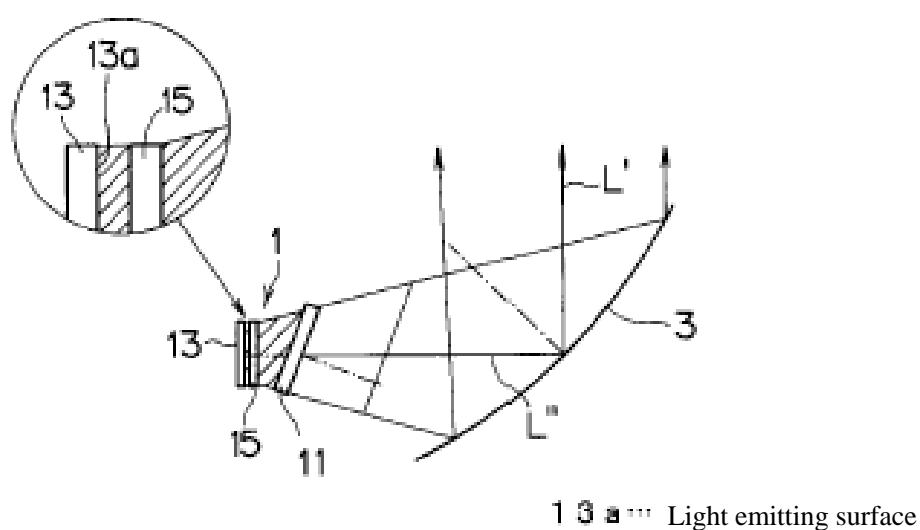
In vehicles, actual images displayed on the combination meter are sometimes presented on a virtual image display device to enable the driver to visually recognize them so as to reduce the burden on the eyes when the focal distance is greatly

changed by the driver's eye movement

[0004]

In such a virtual image display device, the image light from the images displayed on the liquid crystal display is reflected by the reflecting mirror once to several times in the dashboard before the driver virtually recognizes them. Since such repeated reflection of the image light by the reflecting mirror will increase the optical path length, the focal distance will approach that at the time of visual recognition of the scenery ahead of the windshield.

[Chosen drawing] Fig. 10



The present claimed invention relates to a light emitting display device. According to the FIs and the theme codes applied to it in the published unexamined patent application, two corresponding F-term theme codes are determined: 2H088 and 2H091. Meanwhile, the F-term theme code 2H091 has been changed to 2H191. As seen in the tables in Fig. 2 to 8 described in “2. Fields of Optical Instruments”, there are numerous theme codes related to liquid crystals, and the theme lists have been re-created for most of them. This is because the number of patent applications and the number of patent gazette publications have soared as a result of the rapid evolution of liquid crystal displays in recent years, and the rapid increase in the sales of related products and the development of related technologies. Therefore, when the claimed invention belongs to a technical field related to liquid crystals, F-term searches are often conducted using multiple theme codes. Moreover, the theme codes themselves are sometimes found to have been changed when the lists are re-created, as seen in the case of 2H091 changed to 2H191. Although there are a relatively small number of theme codes for the present case of the claimed invention, there are many other cases

that require more theme codes in F-term searches because the case is selected for convenience of explanation.,.

Furthermore, regarding the theme codes 2H091 and 2H191, additional codes as described in “6. Overview of F-term” are added to some F-term viewpoints, such as the viewpoint of FA. Therefore, additional codes should be understood with reference to the description of F-terms for 2H091 and 2H191. Drawings to describe F-terms are omitted here.

In conducting F-term searches in practice, there are cases where there are no F-term theme codes corresponding to the claimed invention. In such cases, the theme codes must be selected based on the IPC codes for the technical fields of the invention, with reference to the tables as shown in Fig. 2 to 8. Here, it should be noted that IPC codes corresponding to theme codes are fragmented and dispersed, or conversely, the theme codes corresponding to IPC groups are fragmented and dispersed. This is not surprising, because the F-terms were originally developed as a supplemental search tool to the IPC. Therefore, great care should be taken in selecting theme codes when F-term searches are conducted in fields related to liquid crystals, such as that of the present claimed invention.

When the F-term theme codes of 2H088 and 2H191 are applied corresponding to each of the constituents included in claim 1 of the present invention, the results are as shown below. Additionally, the F-term lists for 2H099 and 2H191 are omitted.

Claim 1: A light-emitting display device comprising a reflecting member that is placed obliquely with respect to the line of sight (2H088: HA21, 2H191: FA31), and a liquid crystal display that is placed obliquely with respect to the line of sight reflected by the said reflecting member (2H191: FD08), wherein light is emitted from behind the said liquid crystal display by the backlight (2H088: HA28, 2H191: FA81) to direct the light from the image formed on the said crystal display to the said reflecting member so that a virtual image recognized on the said reflecting member (2H088: EA23, 2H191: MA03) may be visually recognized on a surface perpendicular to the said line of sight, wherein the light emitting surface of the said back light is placed perpendicular to the line of sight reflected from the said reflecting member (2H191: FD16), and a focusing lens is provided between the said backlight and the said liquid crystal display to focus the light flux of the said illumination light in such a manner that the light flux of the said illumination light emitted from the said light emitting surface may stay within the range of the said liquid crystal display and, at the same time, the light flux of the said illumination light that is turned into image light of the said displayed image as it passes through the said liquid crystal display may stay within the range of the said reflecting member (2H088: MA06, 2H191: LA24).

Meanwhile, explanations of other claims are omitted.

The F-terms above were selected based on our experience, with the same matters as

described in example 1 taken into consideration.

First, in terms of 2H088, search formulae are formulated to search the F-terms: the following formula (1) was formulated and a search was conducted.

Formula (1): EA23*HA21*HA28*MA06

The number extracted was 22. As a result of the screening, a useful prior art document, the unexamined patent application H11-338366 (publication 1), was successfully found.

Then, “MA06” was eliminated from formula (1) to derive formula (2).

Formula (2): EA23*HA21*HA28 – Formula (1)

$$= \text{EA23*HA21*HA28} - [\text{EA23*HA21*HA28*MA06}]$$

The number extracted was 106, and the screening resulted in failure to find useful prior art documents.

Then, “EA23” was eliminated from formula (2) to derive formula (3).

Formula (3): HA21*HA28 – Formula (2)

$$= \text{HA21*HA28} - [\text{EA23*HA21*HA28}]$$

The number extracted was 3897. Since no screening was possible, the search was terminated.

Now, in terms of 2H191, search formulae are formulated to search the F-terms. The following formula (4) was formulated, and a search was conducted.

Formula (4): FA31*FA81*FD08*FD16*MA03*LA24

The number extracted was 0.

Then, “FA 31” was eliminated from formula (4) to derive formula (5).

Formula (5): FA81*FD08*FD16*MA03*LA24 – Formula (4)

$$= \text{FA81*FD08*FD16*MA03*LA24} - [\text{FA31*FA81*FD08*FD16*MA03*LA24}]$$

The number extracted was 0.

Next, “FA 81” was eliminated from formula (5) to derive formula (6).

Formula (6): FD08*FD16*MA03*LA24 – Formula (5)

$$= \text{FD08*FD16*MA03*LA24} - [\text{FA81*FD08*FD16*MA03*LA24}]$$

The number extracted was 5, and the screening resulted in failure to find useful prior art documents.

Then, “FD08” and “FD16” were eliminated from formula (6) to derive formula (7).

Formula (7): MA03*LA24 – Formula (6)

$$= \text{MA03*LA24} - [\text{FD08*FD16*MA03*LA24}]$$

The number extracted was 130. As a result of the screening, a useful prior art document—the unexamined patent application H09-159986 (publication 2)—was successfully found.

Publication 1: Unexamined Patent Application H11-338366 Official Gazette
(Published on December 10, 1999)

[Title of the invention] On-vehicle use head-up display

[Scope of claims]

[Claim 1] A head-up display for vehicles comprising: a light source system (L) placed on the rear side of the instrument panel (I) located below the front windshield (W) inside the vehicle; a liquid crystal panel (P) placed in front of the said light source system located on the rear side of the said instrument panel so as to transmit the displayed information in the form of image light when the light from the said light source system passes through it; and the catoptric systems (M1 and M2) placed in front of the said liquid crystal panel on the rear side of the said instrument panel which reflect the incoming image light transmitted from the said liquid crystal panel to direct it through the upper wall opening (I1) of the said instrument panel to an appropriate place on the said front windshield, so that the said front windshield will reflect the said reflected light to display virtual images of the displayed information: wherein the said light source system is a light emitting lighting element comprising: a lighting element (10) which directs the light transmitted from its front part (10a) directly to the liquid crystal panel, and a reflector (20) which is placed at the rear side of the lighting element to reflect the light transmitted from behind the said lighting element so as to direct it to the said liquid crystal panel, and wherein the said reflector comprises: a paraboloidal wall part having a parabolic cross section (22) and facing the said upper part (12b) on the rear side of the said lighting element so as to reflect almost all the light transmitted from there; and a spherical wall part having an arc-shaped cross section (21) and facing the rear part (12c) of the said lighting element so as to reflect almost all the light transmitted from there.

[Claim 2] The overhead display for vehicles according to claim 1, wherein the focal point of the said paraboloidal wall part with a parabolic shaped cross-section and that of the said spherical wall part featuring an arc-shaped cross section are located on the optical axis (S) of the said lighting element.

[Claim 3] The overhead display for vehicles according to claim 2 wherein the angle, with the said focal point centered between the upper end and the lower end of the said paraboloidal wall part with a parabolic shaped cross section, ranges from 20 degrees to 35 degrees.

[Claim 4] The overhead display for vehicles according to one of claims 1 through 3 comprises a convex lens (30) that is placed between the said lighting element and the said liquid crystal panel so as to convert the light transmitted from the front part of

on June 20 1997)

[Title of the invention] Information display device for vehicles

[Scope of the claims]

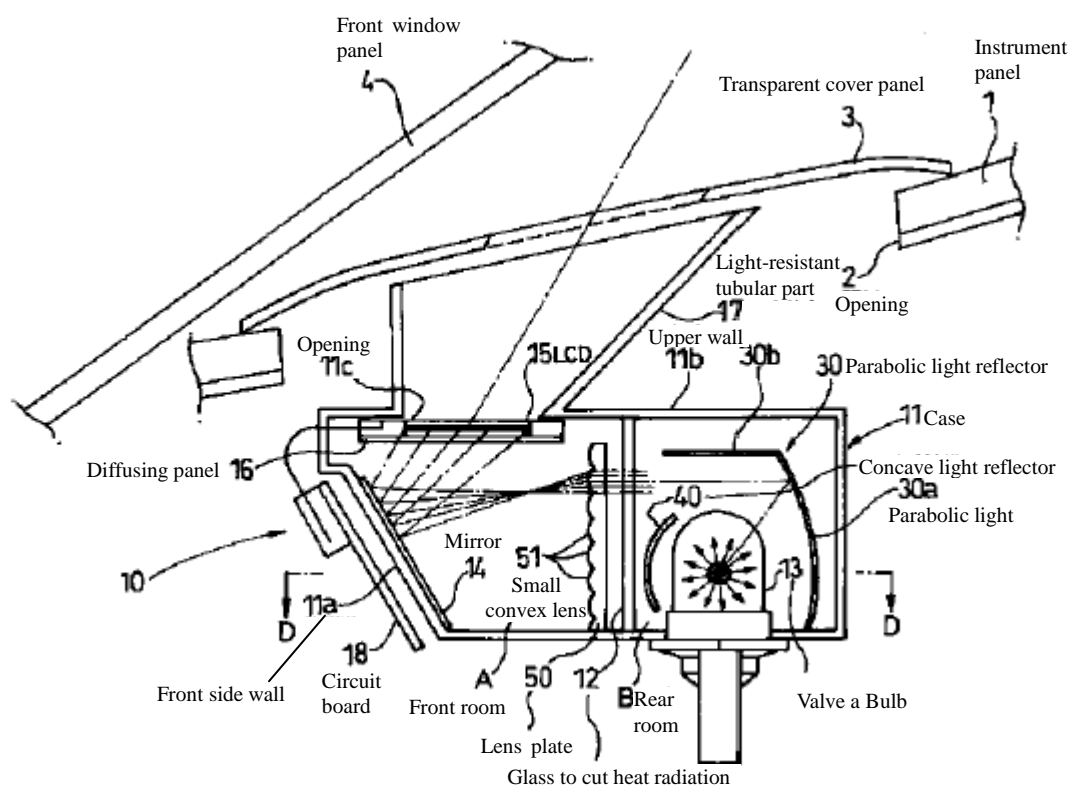
[Claim 1] A head-up display device comprising: a liquid crystal indicator through which the light illuminated from the light source is projected onto the transparent reflecting plate with which the light is reflected to the driver's eye point, wherein the vehicle information displayed on the liquid crystal display is presented as if the images were formed up in the air ahead of the driver, so that the driver may visually recognize it, wherein a lens plate consisting of many small parts of lenses connected together is placed between the said light source and the liquid crystal display

[Abstract]

[Problem] To provide an information display device that can efficiently make use of light from illumination light sources that have so far been wasted

[Means for solving the problem] A head-up display device comprises a liquid crystal 15, through which light emitted from the bulb 13 is projected from the front side of the driver to the driver's eye point EP, wherein the vehicle information including characters and figures displayed on the liquid crystal display 15 is presented in a manner as if the images were formed up in the air ahead of the driver, so that the driver may visually recognize it, wherein a lens plate 50 consisting of many small parts of lenses 51, 52 connected together is placed between the bulb 13 and the liquid crystal display 15

[Chosen drawing] Fig. 1



Example 3: Patent Application: 2004-130880 (Filed on April 27, 2004) (Unexamined Patent Application: 2005-31537)

[FI] G02B 23/18, G02B 7/04 D, G02B 7/06 Z

[Reference F-terms] 2H039 AA04, AB45, AB47, 2H044, BD06, BD10

[Title of the invention] Eyepiece mechanism for binoculars

[Scope of the claims]

[Claim 1] An eyepiece mechanism for binoculars comprises eyepiece frames provided at the eyepiece side edges of the right and left barrels, fixed frames provided for these eyepiece frames, and cam pins provided for these fixed frames, wherein an eyepiece ring is fitted to the said fixed frame so as to freely rotate and, at the same time, freely slide along the optical axis; a guide groove provided for the eyepiece ring is fitted to the said cam pin and the guide groove is formed so that when the said eyepiece ring is rotated around the said optical axis, the eyepiece ring, guided by the said cam pin, may slide along the optical axis and be fixed stepwise at specified positions along the optical axis.

[Abstract]

[Problem] To provide an eyepiece mechanism for binoculars, with which an eyepiece

ring is placed at a position suitable for the viewer.

[Means for solving the problem] The eyepiece mechanism 20 for binoculars comprises eyepiece frames 17, 18 provided at the eyepiece side edges of the right and left barrels 11, 12, fixed frames 25 provided for the eyepiece frames 17, 18, and cam pins 26 provided for the fixed frames 25, wherein an eyepiece ring 28 is fitted to the fixed frame 25 so as to freely rotate and, at the same time, freely slide along the optical axis 29; a guide groove 30 provided for the eyepiece ring 28 is fitted to the cam pin 26 and the guide groove 30 is so formed that, when the eyepiece ring 28 is rotated, the eyepiece ring 28, guided by the cam pin 26, may slide along the optical axis 29 and may be fixed stepwise at specified positions P1 through P3 along the optical axis 29.

[Detailed description of the invention] (Partial excerpt)

[Technical field]

[0001]

The present invention relates to an eyepiece ring mechanism for binoculars equipped with an eyepiece ring on the eyepiece side of right and left barrels

[Background art]

[0002]

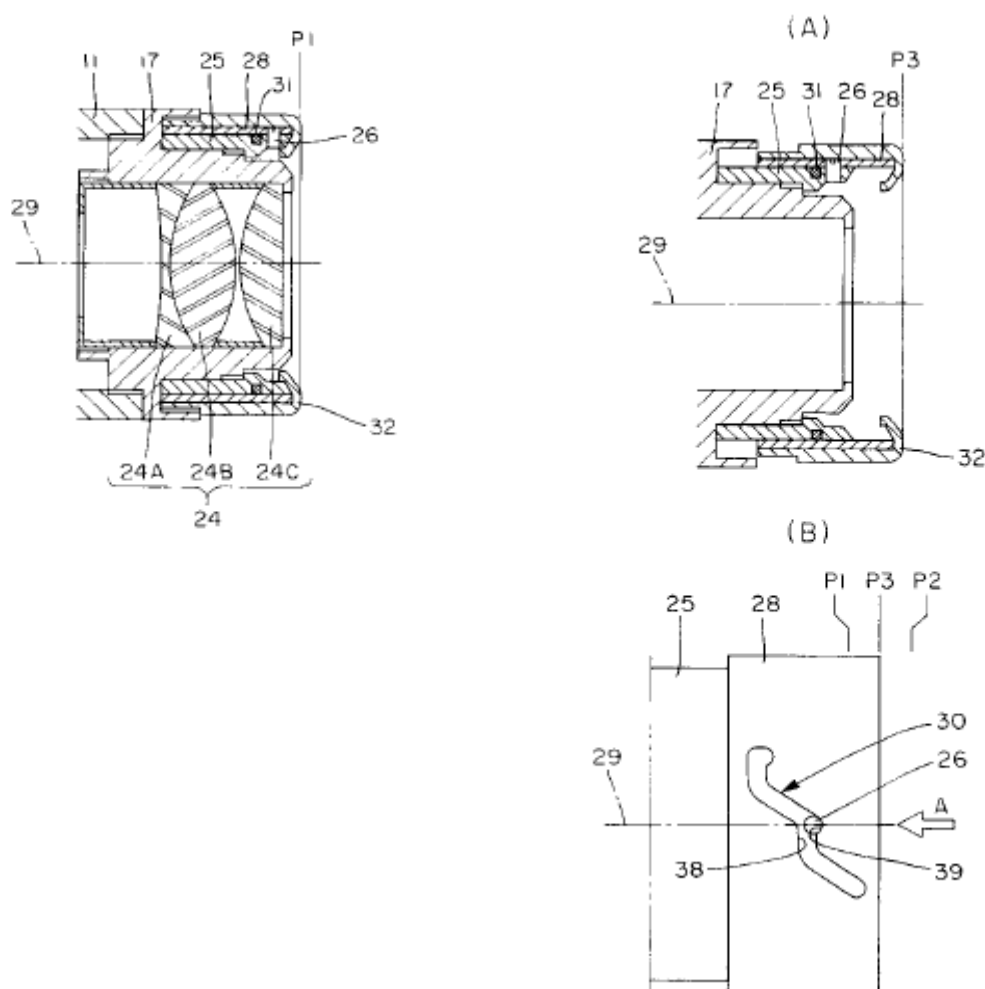
Conventionally, an eyepiece mechanism is generally provided for binoculars on the eyepiece side of right and left barrels. This eyepiece mechanism comprising ring-shaped eyepiece rings provided on the eyepiece side of right and left barrels is so formed that these eyepiece rings may project in the direction away from the eyepiece lens, or toward the near side of the viewer. When the viewer looks into binoculars, the eyepiece rings are projected in the direction away from the eyepiece lens so that they may come in contact around the viewer's eyes to keep a good distance between the eyepiece lens and the viewer's eyes.

[0003]

Here, when a viewer wearing glasses uses binoculars, the eyepiece rings will come in contact with the glasses, resulting in too large of a distance between the eyepiece lens and the viewer's eyes.

For this reason, the eyepiece rings are usually so constituted that the eyepiece ring may be moved in the direction away from or toward the eyepiece lens via a rotating operation around the optical axis.

[Chosen drawing] Fig. 2



The present claimed invention is related to an eyepiece mechanism provided for binoculars. According to the FIs and the theme codes applied to it in the published unexamined patent application, two corresponding F-term theme codes are determined: 2H039 and 2H044. As seen in the Patent Map Guidance System (PMGS) in Fig. 16 described in “7. Search examples using FI and F-terms”, it is clear that GO2B23/00–23/22 correspond to 2H039, and that GO2B23/24–23/26 correspond to 2H044. Other points to be noted are the same as those described in Examples 1 and 2.

When the F-term theme codes of 2H039 and 2H044 are applied corresponding to each of the constituents included in claim 1 of the present invention, the results are as shown below. Additionally, the F-term lists for 2H039 and 2H044 are omitted.

Claim 1: An eyepiece mechanism for binoculars (2H039: AA04) comprises eyepiece frames (2H039: AB47) provided at the eyepiece side edges of the right and left barrels, fixed frames provided for these eyepiece frames, and cam pins (2H044: BD06)

provided for these fixed frames, wherein an eyepiece ring is fitted to the said fixed frame so as to freely rotate and, at the same time, freely slide along the optical axis; and a guide groove provided for the eyepiece ring is fitted to the said cam pin and the guide groove is so formed that when the said eyepiece ring is rotated around the said optical axis, the eyepiece ring, guided by the said cam pin, may slide (2H039:AB45, 2H044:BD10) along the optical axis and may be fixed stepwise at specified positions along the optical axis.

The F-terms above were selected based on our experience, with the same matters as described in example 1 taken into consideration.

First, in terms of 2H039, search formulae are formulated to search the F-terms: the following formula (1) was formulated and a search was conducted.

Formula (1): AA04*AB45*AB47

The number extracted was 9. The screening resulted in failure to find useful prior art documents.

“AA04” was then eliminated from formula (1) to derive formula (2).

Formula (2): AB45*AB47 – Formula (1)

= AB45*AB47-[AA04*AB45*AB47]

The number extracted was 10, and the screening resulted in failure to find useful prior art documents.

“AB 45” was then eliminated from formula (2) to derive formula (3).

Formula (3): AB47 – Formula (2)

= AB47-[AB45*AB47]

The number extracted was 172. As a result of the screening, a useful prior art document, the unexamined patent application H07-043616 (publication 1), was successfully found.

Now, in terms of 2H044, search formulae are formulated to search the F-terms: the following formula (4) was formulated and a search was conducted.

Formula (4): BD06*BD10

The number extracted was 530. Since no screening was possible, the search was terminated.

Publication 1: Unexamined Patent Application H07-043616 Official Gazette
(Published on December 10 1999)

[Title of the invention] Optical device

[Scope of claims]

[Claim 1] An optical device comprising: an eyepiece into which a cylindrical eye cup member is fitted to slide freely, wherein the eye cup member is energized by a spring

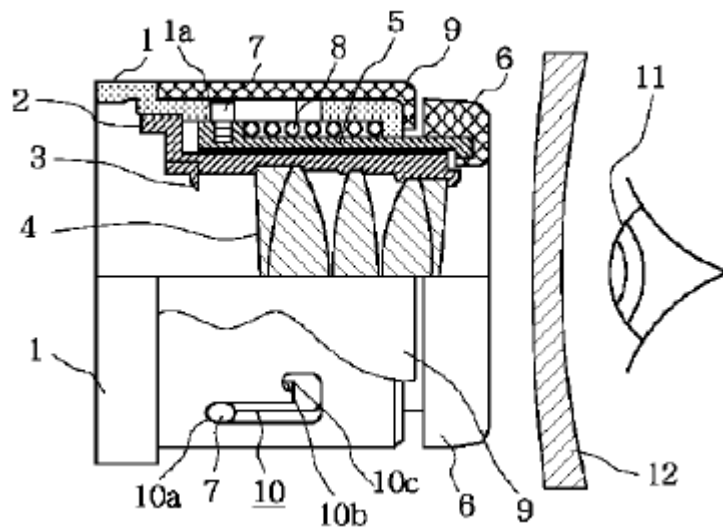
member in the direction opposite to the viewer, and a locking means is provided to keep constant the distance between the ocular lens and the said eye cup member at two points or more. The said locking means comprises a cam for which at least two locking points are provided along the optical axis of the ocular lens and a cam pin.

[Abstract]

[Purpose] To provide an optical device comprising an eye cup whose rubber member is easily and lightly extended/contracted without destabilizing the position of the eye pupil, so as to overcome the problem with the conventional eye cup whose rubber member is deformed when folded into layers.

[Constitution] The present invention comprises an eye cup fitted into an eye piece and usually held in the storage position by being pulled in the direction opposite to the viewer by the energizing force of the spring, wherein, at the time of observation, when the viewer pulls out the eye cup up to the position suitable for him/her, the cam and the cam pin will stop the movement and rotation of the eye cup only in the direction of the energizing force of the spring.

[Chosen drawing] Fig. 1



Example 4: Patent application 2004-234659 (Filed on August 11, 2004) (Unexamined Patent Application: 2006-053330)

[FI] G03B 17/08, G03B 17/56 H, H04N 5/225 E

[Reference F-terms] 2H101 CC01, CC52, CC54 2H105 DD07, EE07 5C122 DA03, DA04, EA02, GE09, GE21

[Title of the invention] Waterproof case for camera

[Scope of the claims]

[Claim 1]

A waterproof case for cameras in which to store a camera comprising a case body and a lid providing water-tightness while allowing operation of cameras from outside, wherein a watertight member is provided either for the said case body or the lid to keep the joint watertight when the lid is fitted to the case; and, at the same time, at least a part of the portion facing the said watertight member provided either for the said case body or the lid is furnished with a transparent waterproof inspection window with a bulging curved surface.

[Claim 2]

The waterproof case for cameras according to claim 1 wherein the said watertight member is an O-ring, and the said waterproof inspection window is a cylindrical lens providing see-through observation over almost the entire circumference of the O-ring.

[Abstract]

[Problem] To provide a waterproof case for cameras allowing easy inspection of foreign matter such as hair and dust sticking at a portion fastened by either the lid made of watertight materials or the case body

[Means for solving the problem] The waterproof case for cameras 2, where

photographing equipment is stored, comprises a case body 5, a lid 6 to fit to the case body 5, and an O-ring 7 to be fixed in the groove 6a formed on the lid 6. The case body 5 and the lid 6 are made of transparent plastic. At the edge of the lid 6 is provided a waterproof inspection window 58 featuring a transparent bulging curved surface, functioning as a convex lens. This provides an enlarged view of the fastened portion through the waterproof inspection window 58. This makes it easy to find foreign matter sticking to the fastened portion.

[Detailed description of the invention] (Partial excerpt)

[Technical field]

[0001]

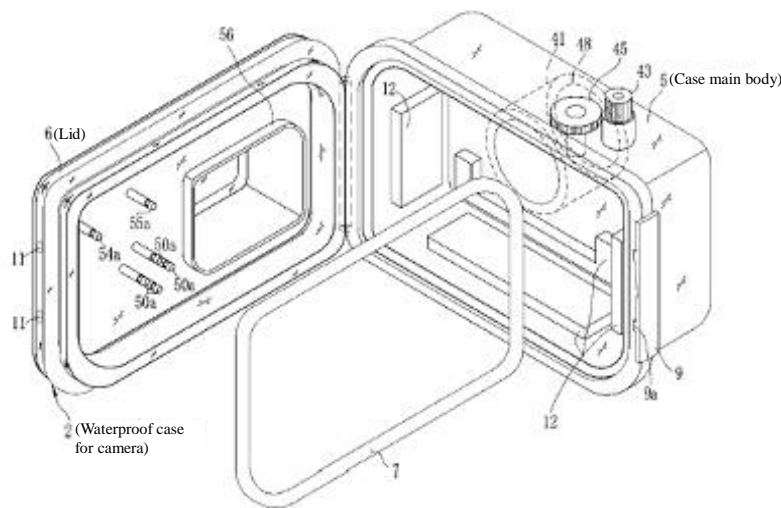
The present invention relates to a waterproof case for cameras to store photographing equipment.

[Background art]

[0002]

In underwater photography with a digital camera, a digital camcorder and other photographing equipment, waterproof cases are widely used to store cameras water-tightly. Shown in Fig. 6 is a general structure of conventionally familiar waterproof cases for cameras. This waterproof case 100 for cameras comprises a transparent case body 101 in the form of a box and, similarly, a transparent lid 102, wherein the O-ring 103 is fastened between the case body 101 and the lid 102, in which to store the digital camera 105. Since the O-ring 103 is an elastic body, it will be deformed by being tightly fitted to the case body 101 and the lid 102, increasing the water-tightness inside the waterproof case 100 for cameras. Some other waterproof cases are equipped with a water leakage sensor to detect water leakage inside the case. Furthermore, in recent years, various means have been devised to prevent water leakage, including the placement of duplicate O-rings 103, in between which a water leakage sensor is then placed.

[Chose drawing] Fig. 1



The present claimed invention is an invention regarding a waterproof case for cameras. According to the FI and the theme code applied to it in the published unexamined patent application, it is found that the corresponding IPC subclass includes not only GO3B related to optical equipment, but also H04N. As a result, the corresponding F-term theme code includes not only 2H101 and 2H105, but also 5C122. The title of the IPC subclass H04N is “Image transmission, ex. television”. Furthermore, the subgroup 5/225 is “TV camera”, while GO3B is a subclass related to photography and the main group 17/00 is “Cameras and details of camera bodies and attachments thereof.”

In the past, a so-called camera simply meant a camera using so-called silver-salt film, and the invention related to waterproof cases for cameras as camera attachments was classified into G03B17/00 or its subgroups. In recent years, however, a camera, when simply referred to, instead means a digital camera. Furthermore, there are more cameras that provide not only still images, but also moving ones.

Therefore, as described in “Background art”, it is naturally considered today that when simply referred to, a camera means that which features the function of a so-called camcorder. Thus, it should be noted that in conducting F-term searches in the fields related to cameras, including those of the present invention, it is sometimes necessary to select the theme code of “television cameras”.

Here, an explanation is only given of F-term searches using theme codes related to optical devices. An explanation of F-term searches using the theme code of “television cameras” categorized in other fields is omitted. When the F-term theme codes of 2H101 and 2H105 are applied corresponding to each of the constituents

included in claim 1 of the present invention, the results are as shown below. Additionally, the F-term lists for 2H101 and 2H105 are omitted.

Claim 1: A waterproof case for cameras (2H101; CC01, 2H105;DD07) to store a camera comprising a case body and a lid providing water-tightness (2H101: CC52) while allowing the cameras to be operated from outside; wherein a watertight member (2H101: CC54) is provided either for the said case body or the lid to keep the joint watertight when the lid is fitted to the case, and at least a part of the portion facing the said watertight member is simultaneously provided for the said case body, or the lid is furnished with a transparent waterproof inspection window (2H105: EE07) with a bulging curved surface.

Meanwhile, explanations of other claims are omitted.

The F-terms above were selected based on our experience, with the same matters as described in example 1 taken into consideration.

First, in terms of 2H101, search formulae are formulated to search the F-terms: the following formula (1) was formulated and a search was conducted.

Formula (1): $CC01*CC54$

The number extracted was 33, and the screening resulted in a failure to find useful prior art documents.

Next, “CC54” in formula (1) was replaced with “CC52” to derive formula (2).

Formula (2): $CC01*CC52 - \text{Formula (1)}$

$= CC01*CC52-[CC01*CC54]$

The number extracted was 109. As a result of the screening, a useful prior art document, the unexamined patent application 2001-091995 (publication 1), was successfully found.

Then, “CC52” was eliminated from formula (2) to derive formula (3).

Formula (3): $CC01 - \text{Formula (2)}$

$= CC01-[CC01*CC52]$

The number extracted was 282, and the screening resulted in failure to find useful prior art documents.

Now, in terms of 2H105, search formulae are formulated to search the F-terms. The following formula (4) was formulated and a search was conducted: Formula (4): $DD07*EE07$

The number extracted was 21, and the screening resulted in a failure to find useful prior art documents.

“DD07” was then eliminated from formula (4) to derive formula (5).

Formula (5): $EE07 - \text{Formula (4)}$

$$= EE07 - [DD07 * EE07]$$

The number extracted was 31, and the screening resulted in failure to find useful prior art documents.

Then, “EE07” was eliminated from formula (4) to derive formula (6).

Formula (6): $DD07 - \text{Formula (4)}$

$$= DD07 - [DD07 * EE07]$$

The number extracted was 137. As a result of the screening, a useful prior art document, the unexamined patent application H08-043906 (publication 2), was successfully found.

Publication 1: Unexamined patent application 2001-091995 Patent gazette (Published on April 6, 2001)

[Name of the invention] Waterproof film unit with a lens

[Scope of claims]

[Claim 1] A waterproof film unit with a lens comprising: two case members, a locking pawl provided for one of the said case members, a piece to be locked provided for the other case member, wherein a waterproof case is formed by pawl-coupling of the locking pawl and a piece to be locked in order to store the film unit with a lens, wherein a locking groove is formed on the piece to be locked, which is engaged by the said locking pawl to lock the waterproof case.

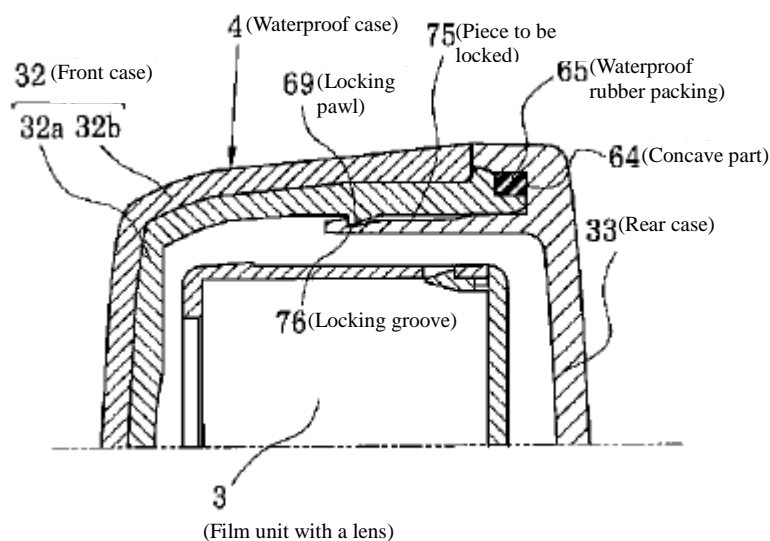
[Claim 2] The waterproof film unit with a lens according to claim 1, wherein one of the said case members is used as a front case, on the inside surface of which the said locking pawl is formed as a projection, and the other member of the said case member is used as a rear case, on which the said piece to be locked is provided, at the top end of which is formed the said locking groove so as to face the said locking pawl.

[Abstract]

[Problem] To prevent the case for the waterproof film unit with a lens from opening due to falling impact or thermal deformation

[Means for solving the problem] A waterproof case 4 comprises a front case 32 and a rear case 33 integrated into one by pawl-coupling, wherein a locking pawl 69 engages a locking groove 76. The locking pawl 69 is formed as a projection on the inside surface of the front case 32. The locking groove 76 is formed at the top end of the piece to be locked 75 provided for the rear case 33. Since the locking groove 76 is thus formed, no branching flow of resin materials occurs at the top end of the piece to be locked 75 when the rear case 33 is molded, reducing the formation of weld lines. This ensures firm coupling, preventing the case from opening due to falling impact, thermal deformation or increased internal pressure.

[Chosen drawing] Fig.2



Publication 2: Unexamined patent application H08-043906 Patent gazette (Published on Feb. 16, 1996)

[Title of the invention] Waterproof film unit with a lens

[Scope of the claims]

[Claim 1] A waterproof film unit with a lens comprises a film unit incorporating a taking lens and an exposure-counting mechanism wherein which a photographic film is stored beforehand, and a waterproof case where the film unit with a lens is stored in a watertight manner, wherein at least part of the waterproof case facing the said taking lens is made of a transparent plastic material of polymethylmethacrylate (PMMA).

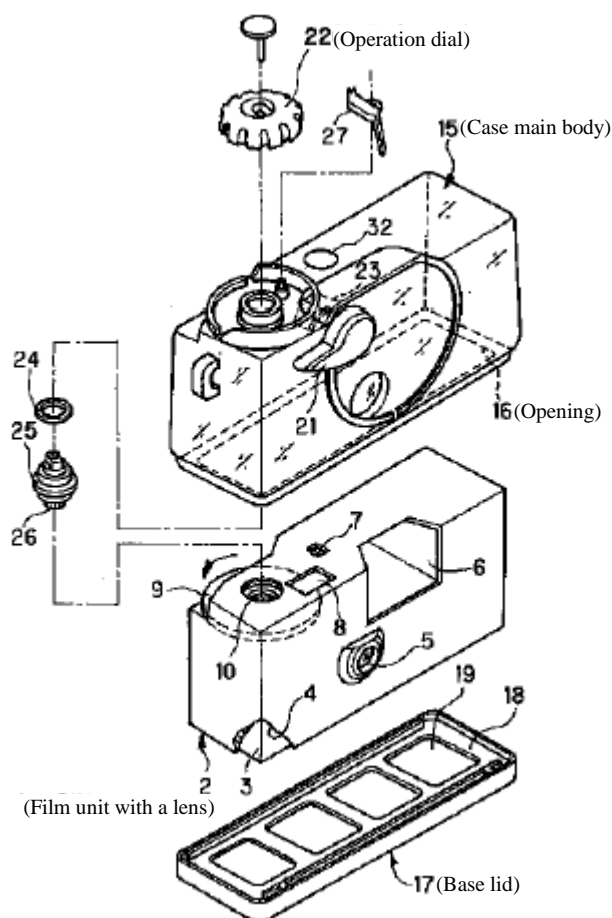
[Claim 2] The film unit with a waterproof mold lens according to claim 1, wherein the said waterproof case comprises a transparent case body within which the film unit with a lens is stored and a lid which keeps the inside of the case body watertight, wherein the said case body is integrated into one by molding a plastic material of polymethylmethacrylate (PMMA).

[Abstract]

[Purpose] To provide a waterproof film unit with a lens which can be used for a long time in a high-temperature environment, and which can prevent the generation of crazing due to adhesion of anti-suntan cream, etc.

[Constitution] The waterproof film unit with a lens provides watertight storage of the film unit 2 equipped with a taking lens 5 and an exposure counting mechanism by means of a box-shaped transparent waterproof case 15 and a bottom cover 17. The waterproof case 15 is molded into one with polymethylmethacrylate (PMMA) in order to prevent crazing.

[Chosen drawing] Fig. 1



Example 5: Patent application 2005-340865 (Application November 25, 2005)
(Unexamined patent application 2007-149881)

[FI] H01L 33/00 E [Reference F-term] 5F041 CA04, CA13, CA40, CA65, CA74, CA83, CA91, CA92, CB11, CB15, DA03, DA07, DA12, DA18, DA26, DB01

[Title of the invention] Semiconductor light-emitting element and light-emitting device

[Scope of the claims]

[Claim 1] A semiconductor light-emitting element on which are laminated a semiconductor layer containing an active layer, an ohmic electrode to be connected to the said semiconductor layer, and a pad electrode to be connected to the outside, comprising: an intermediate conductive layer which is provided between the said ohmic electrode and the said pad electrode, and the first contact part where the said ohmic electrode is connected to the said intermediate conductive layer, while the second contact part where the said pad electrode is connected to the said intermediate conductive layer are formed at different positions as viewed in the lamination

direction.

[Claim 2] A semiconductor light-emitting element on which are laminated a semiconductor layer containing an active layer, an ohmic electrode to be connected to the said semiconductor layer, and a pad electrode to be connected to the outside, wherein the said semiconductor layer, the said ohmic electrode, and the said pad electrode are connected to a conductive supporting substrate via a conductive fusion layer, comprising: an intermediate conductive layer which is provided between the said ohmic electrode and the said pad electrode, while the first contact part where the said ohmic electrode is connected to the said intermediate conductive layer and the second contact part where the said pad electrode is connected to the said intermediate conductive layer are formed at different positions as viewed in the lamination direction.

[Claim 3] The semiconductor light-emitting element according to claim 1 or 2, wherein the said ohmic electrode is so constituted as to allow light to penetrate, wherein the said intermediate conductive layer is a conductive reflecting layer that is able to reflect light

[Claim 4] The semiconductor light-emitting element according to claim 3, wherein the said intermediate conductive layer contains an Ag layer

[Claim 5] The semiconductor light-emitting element according to any one of claims 1 to 4, wherein two or more of at least either one of the said first contact part and the said second contact part are formed

[Claim 6] The semiconductor light-emitting element according to any one of claims 1 to 5, wherein a diffusion prevention layer is formed between the said ohmic electrode and the said intermediate conductive layer, and between the said intermediate conductive layer and the said pad electrode, so as to prevent diffusion of low-melting-point metals

[Claim 7] A light-emitting device comprising a semiconductor light-emitting element on which are laminated a semiconductor layer containing an active layer, an ohmic electrode to be connected to the said semiconductor layer, a pad electrode to be connected to outside, and a holding member which holds the said semiconductor light-emitting element and reflects light emitted from the said semiconductor light-emitting element, the pad electrode of which is attached to the said holding member by the solder layer; wherein the said semiconductor light-emitting element is provided with an intermediate conductive layer between the said ohmic electrode and the said pad electrode, and the first contact part where the said ohmic electrode is connected to the said intermediate conductive layer and the second contact part where the said pad electrode is connected to the said intermediate conductive layer are formed at different positions as viewed in the lamination direction.

[Abstract]

[Problem to be solved] To provide a semiconductor light-emitting element and a light-emitting device capable of reducing changes in voltage characteristics caused by soldering.

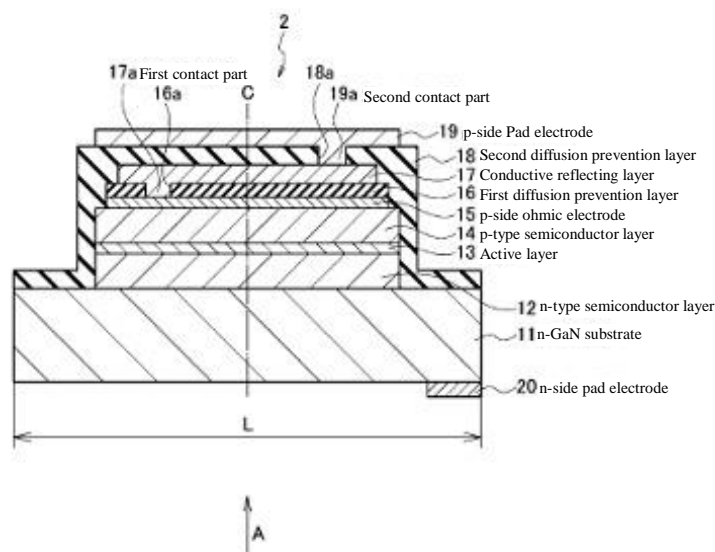
[Means for solving the problem] The light-emitting device 1 is provided with a semiconductor light-emitting element 2, a holding member 3 including a positive electrode terminal 3a, a negative-electrode terminal 4, and a protection member 5 made of resin. The semiconductor light-emitting element 2 has a semiconductor laminated structure on the substrate 11, from which are laminated an n-type semiconductor layer 12, an active layer 13, a p-type semiconductor layer 14, a p-side ohmic electrode 15, a first diffusion prevention layer 16, a conductive reflective layer 17, a second diffusion prevention layer 18, and a p-side pad electrode 19. On the conductive reflective layer 17 is formed a first contact 17a to provide a connection to the p-side ohmic electrode 15. In the p-side pad electrode 19 is formed a second contact 19a to provide a connection to the conductive reflective layer 17. The second contact 19a and the first contact 17a are formed at different positions as viewed in the lamination direction.

[Detailed description of the invention] (Partial excerpt)

[Technical field]

[0001] The present invention relates to a semiconductor light-emitting element and a light-emitting device to which a pad electrode is connected by conductive bonding agents, such as solder containing low-melting-point metals that are able to diffuse easily within semiconductors.

[Chosen drawing] Fig. 1



The present claimed invention is an invention regarding semiconductor light-emitting elements including light-emitting diodes and light-emitting devices using the semiconductor light-emitting elements concerned. According to the FIs and the theme codes applied in the published unexamined patent application, the F-term theme code 5F041 corresponding to the invention is determined. However, the theme code 5F041 was separated into 5F141 and 5F 142 in 2011 and the lists were re-created. This is identified through reference to the theme code table, as those shown in Figs. 2 to 8 described in “2. Fields of Optical Instruments”, of the theme group 5F. This is because the numbers of patent applications and patent gazettes publications have soared as a result of the rapid evolution of light-emitting diodes in recent years, the rapid increase in the sales of related products, and the development of related technologies.

However, according to the theme code table above, reanalysis of the documents for 5F142 will not be completed until fiscal 2014. This means that the F-terms of 5F142 have not yet been applied to all the documents that need to be searched. Meanwhile, in terms of 5F141, a reanalysis of documents has been completed, and F-terms have been applied to all the patent documents classified into 5F141. Patent searches will not be adequate if the theme code 5F141 alone is selected, since 5F141 is a part of 5F041 divided into two. Fortunately, the present invention was filed in 2005, before 5F041 was divided into 5F141 and 5F142 in 2011, allowing 5F041 to be selected.

Thus, 5F041 is selected here. When the F-terms of the theme code 5F041 are applied to correspond to each constituent included in claim 1 of the present invention, the results are as shown below, and the F-term list for 5F041 is omitted.

Claim 1: A semiconductor light-emitting element on which are laminated (CA92) a semiconductor layer containing an active layer, an ohmic electrode to be connected to the said semiconductor layer, and a pad electrode (DA07) to be connected to outside, wherein an intermediate conductive layer is provided between the said ohmic electrode and the said pad electrode;

A semiconductor light-emitting element (CA04, CA40, CA65, CB11), wherein the first contact part where the said ohmic electrode is connected to the said intermediate conductive layer and the second contact part where the said pad electrode is connected to the said intermediate conductive layer are formed at different positions as viewed in the lamination direction.

Meanwhile, an explanation of other claims is omitted.

The F-terms above were selected based on our experience, with the same matters as described in example 1 taken into consideration.

Now, search formulae are formulated to search the F-terms. First, the following formula (1) was formulated to conduct the search.

Formula (1): CA04*CA40*CA65*CA92*CB11*DA07

The number extracted was 4, and the screening resulted in failure to find useful prior art documents.

Next, “DA07” was eliminated from formula (1) to derive formula (2).

Formula (2): $CA04*CA40*CA65*CA92*CB11$ – Formula (1)

$$= CA04*CA40*CA65*CA92*CB11-[CA04*CA40*CA65*CA92*CB11*DA07]$$

The number extracted was 11, and the screening resulted in failure to find useful prior art documents.

Then, “CB11” was eliminated from formula (2) to derive formula (3).

Formula (3): $CA04*CA40*CA65*CA92$ – Formula (2)

$$= CA04*CA40*CA65*CA92-[CA04*CA40*CA65*CA92*CB11]$$

The number extracted was 133, and the screening resulted in failure to find useful prior art documents.

“CA65” was then eliminated from formula (3) to derive formula (4).

Formula (4): $CA04*CA40*CA92$ – Formula (3)

$$= CA04*CA40*CA92-[CA04*CA40*CA65*CA92]$$

The number extracted was 85. As a result of the screening, a useful prior art document, the unexamined patent application 2002-134822 Patent gazette (publication 1), was successfully found.

Publication 1: Unexamined Patent Application 2002-134822 (Published on May 10, 2002)

[Title of the invention] Semiconductor light-emitting device and method of manufacturing the same

[Scope of claims]

[Claim 1] A semiconductor light-emitting device comprising a supporting base and a semiconductor light-emitting element which is mounted on the said supporting base and provided with a laminated body of nitride semiconductor on the GaN board, wherein on the surface of the said GaN board opposite to that provided with the said laminated body, are formed a first metal film made of materials that can provide an ohmic contact with the GaN board that functions as an n-type electrode, a second metal film made of high-melting-point metals that functions as a barrier layer, and a third metal film made of materials that will easily mix with solder, wherein a solder layer is provided between the said third metal film and the said supporting base.

[Claim 2] A semiconductor light-emitting device according to claim 1, wherein the thickness of the said second metal film is 8 nm or more and 80 nm or less.

[Claim 3] A semiconductor light-emitting device comprising a supporting base and a semiconductor light-emitting element that is mounted on the said supporting base

and provided with a laminated body of nitride semiconductor on the GaN board, wherein on the surface of the said GaN board opposite to that provided with the said laminated body, are formed a first metal film made of materials which can form an ohmic junction with the GaN board that functions as an n-type electrode, and a second metal film made of high-melting-point metals that functions as a barrier layer, wherein a layer of an alloy of solder and the third metal that will easily mix with solder is provided between the said second metal film and the said supporting base, and the thickness of the said second metal film is 8 nm or more and 80 nm or less.

[Claim 4] A semiconductor light-emitting device according to any one of claims 1 to 3, wherein the said first metal film contains Al, the said second metal film contains at least one of Mo, W, Cr, Ta, Zr and Mn, and the said third metal film or the said third metal contains at least either Au or Ni.

[Claim 5] A semiconductor light-emitting device according to any one of claims 1 to 4, wherein the said GaN board has a hexagonal crystal structure, and the surface of the said support base to which it is mounted is substantially parallel to the surface c.

[Claim 6] A semiconductor light-emitting device according to any one of claims 1 to 5, wherein the said solder contains at least one of In, Sn, Zn, Au, Pb, Ag, Cd, Bi, Ni, Mn, and Cu.

[Claim 7] A semiconductor light-emitting device according to any one of claims 1 to 3 or in claim 5, wherein the said support base is made of Si, and the said third metal film or the said third metal contains at least one of Au, Ni, and Al.

[Claim 8] A semiconductor light-emitting device according to any one of claims 1 to 3, in claim 5 or in claim 7, wherein the said support base is made of Si, and the said solder contains at least one of In, Sn, Zn, Au, Pb, Ag, Cd, Bi, Ni, Mn, Cu, SnCl₂, and ZnCl₂.

[Claim 9] A semiconductor light-emitting device according to any one of claims 1 to 8, wherein the said support base is made of Si, and the said soldered surface of the said support base is provided with a metal film containing at least one of Pt, Al, Ti, Cr, Co, Ni, Pd, Hf, W, Mo, and Ta.

[Claim 10] A semiconductor light-emitting device according to any one of claims 1 to 9, wherein the said support base is made of Si, and the portion of the said base that comes in contact with the said solder is provided with a metal film containing at least one of Au, Ni, and Al.

[Claim 11] A semiconductor light-emitting device according to claim 9 or claim 10, wherein a photodetector is integrally formed on the said support base made of Si.

[Claim 12] A method of manufacturing a semiconductor light-emitting device according to claim 1, wherein the following processes are included:

a process of forming a wafer having a laminated body of nitride semiconductor on a GaN board;

a process of forming a first metal film, a second metal film and a third metal film on

the surface of the GaN board opposite to that provided with a laminated body;
a process of dividing the said wafer to form semiconductor light-emitting elements;
and

a process of heat-treatment bonding to the support base on which solder is laminated beforehand or a process of heat-treatment bonding to the support base after laminating solder on the said third metal film.

[Claim 13] A method of manufacturing a semiconductor light-emitting device according to claim 2, wherein the following processes are included: a process of forming a wafer having a laminated body of nitride semiconductor on a GaN board;

a process of forming a first metal film, a second metal film and a third metal film on the surface of the GaN board opposite to that provided with a laminated body;

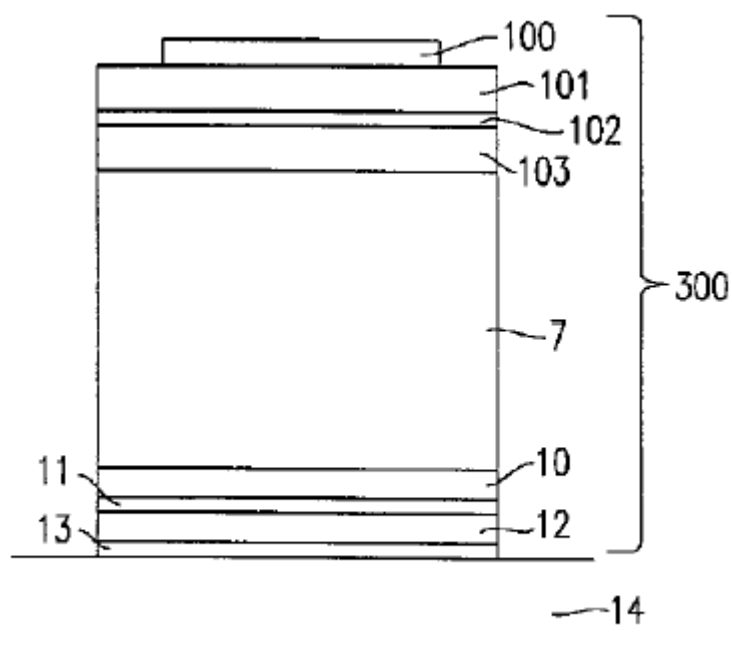
a process of dividing the said wafer to form semiconductor light-emitting elements;
and a process where a support base that has been solder laminated in advance is bonded to an alloy layer, or a process in which the said third metal film, solder laminated and heat treated to form an alloy layer consisting of the said third metal and solder, is bonded to a support base.

[Abstract]

[Problem] To provide materials and structures of electrodes, solders and heat sinks with which to form a highly efficient and reliable device, wherein the said electrodes are equipped with a semiconductor light-emitting element featuring a nitride semiconductor layer on the GaN board.

[Means for solving the problem] On the surface of the GaN board 7 opposite to that provided with nitride semiconductor laminates 101, 102, and 103, a first metal film 10 made of materials containing Al is formed to function as an electrode; on the lower surface of the metal film 10, a second metal film 11 is laminated that functions as a barrier layer to prevent deterioration of the ohmic contact of the electrode due to diffusion of Au, Ni and solder; furthermore on the lower surface of the second metal film 11, a third metal film 12 mainly consisting of Au and Ni is evaporated for metallization; then a solder 13 consisting of In and Sb is bonded to a heat sink 14 mainly containing Au.

[Chosen drawing] Fig.1



9. Concluding comments

Examples classified into some technical fields representing optical instrument technologies were introduced. However, they are only a part and do not represent all the fields of optical instruments. Furthermore, the formulae given here may not be the best ones; they should be considered as examples of the trial and error process and therefore still have room for improvement.

I hope the explanation given here will help you to conduct searches using the FIs and F-terms in the fields of optical instruments by accessing the IPDL of the Patent Office.