Notice of Reasons for Refusal

Patent Application Number	Japanese Patent Application 2010-289130
Drafting Date	July 27, 2011
Patent Office Examiner	Makoto Inoue 3309 2V00
Agent for Patent Applicant	Dear Mr. Manabu Inoue,
Applicable provisions	Article 36

This application should be refused for the following reasons: If you have any comments on this, please submit your Written Opinions within sixty (60) days from the date this notice is sent.

Reasons

1. This application does not meet the requirements set forth in Article 36 Paragraph 4 Item 1 of the Patent Act in terms of the description of Detailed Explanation of the present invention as follows:
2. This application does not meet the requirements set forth in Article 36 Paragraph 6 Item 1 of the Patent Act in terms of the description of the claims as follows.
3. This application does not meet the requirements set forth in Article 36, Paragraph 6, Item 2 of the Patent Act in terms of the description of the claims as follows:

Note

[Reason 1]

There is no explanation in the Detailed Explanation of this application as to what kind of technical significance there is in the description that reads, “the first projection optical unit includes an aperture diaphragm that defines the F value of the entire projection optical unit”, and the said Detailed Explanation of the present invention of this application was not made in accordance with the provisions of the Ministerial Ordinance on Economy, Trade and Industry with respect to the inventions according to Claims 1 through 13.

[Reason 2]

The position of the aperture diaphragm is not specified in the drawings or in the lens data, and it is not clear whether the example “the first projection optical unit includes an aperture diaphragm that defines the F value of the entire projection optical unit”.

There is an explanation in the description of the situation concerning the early review that it is derived from Figure 3, Figure 33, and Table 1, etc., which shows lens data. Please explain in detail how it is derived.

[Reasons 1 and 3]

In the scope and specification of the claims in general, the relationship between the first projection optical unit and the second projection optical unit and the first to third lens groups is not clear. [33] and [0072] of the second projection optical unit indicate that there is a first to third lens group in the second projection optical unit, but the description of [0014] that reads, "F1 that is the F value of the first lens group" and "F2 that is the F value of the second group" is not consistent with the description in Claim 12 that reads, "F1 is the F value of the first projection optical unit" and "F2 is the F value of the second projection optical unit".

[Reason 3]

• Claim 13

It is not clear what it means by "the second projection optical unit is aspheric". Does it mean that the second projection optical unit have an aspheric lens?

Record of investigation results pertaining to literature on prior art

• Fields of investigation: IPC G02B 13/16

・ Literature on prior art: WO 2002/021851

This record of investigation results pertaining to literature on prior art does not constitute a reason for refusal.

If you have any questions regarding the content of this Notice of Reasons for Refusal or wish to have an interview, please contact us at the following.

Contact: Makoto Inoue, Patent Examination 1 Applied Optics (Optical Devices)

TEL. 03 (3581) 1101; Extension: 3271

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Director/Deputy Director	Head Examiner/Deputy Head Examiner	Examiner	Assistant Examiner
	[Tetsu] Toyoo	Makoto Inoue	
	9024	3309	

[Document name] Procedure Revision
[Destination address] To: Director General of Japan Patent Office
[Indication of the case]
[Application number] Japanese Patent Application 2010-289130
[Person making revisions]
[Identification number] 000005108
[Name or title] Hitachi, Ltd.
[Agent]
[Identification number] 100100310
[Patent Attorney]
[Name or title] Manabu Inoue
[Phone number] 03-4235-2473
[Dispatch No.] 515843
[Procedure Revision 1]
[Name of document subject to revision] Scope of Patent Claims
[Name of items subject to revisions] Full text
[Revision Method] Modifications
[Details of revisions]
[Document Name] Scope of Patent Claims
[Claim 1]

A projection optical unit, wherein the projection optical unit that magnifies and projects an image displayed on an image display element is comprised of

a first projection optical unit having a positive refractive power for magnifying the image displayed on the image display element to form a first magnified image; and

a second projection optical unit having a positive refractive power for further enlarging the first magnified image to form a second magnified image;

Wherein the first magnified image is formed on the side of the image display element more than the second projection optical unit;

wherein magnification M1 of the first magnified image for the image displayed in the image display element is less than magnification M2 of the second magnified image for the first magnified image;

wherein the first projection optical unit comprises an aperture diaphragm defining an F value of the entire projection optical unit.

[Claim 2]

The projection optical unit of Claim 1, wherein the first projection optical unit is in a generally telecentric correlation with the image display element side of the first projection optical unit and the first magnified image side, wherein the first magnified image is telecentrically formed.

[Claim 3]

The projection optical unit of Claim 1, wherein the optical axis of the second projection optical unit is eccentric with respect to the optical axis of the first projection optical unit.

[Claim 4]

The projection optical unit of Claim 4, wherein the optical axis of the second projection optical unit is eccentric with respect to the optical axis of the first projection optical unit so that the optical axis of the second projection optical unit is offset from the center of the screen.

[Claim 5]

The projection optical unit of Claim 4, wherein the second projection optical unit is eccentric with respect to the first magnified image.

[Claim 6]

The projection optical unit of Claim 4, wherein the optical axis of the image display element and the optical axis of the first projection optical unit are not eccentric.

[Claim 7]

The projection optical unit of Claim 5, wherein the optical axis of the second projection optical unit is eccentric with respect to the optical axis of the first projection optical unit in a direction above a center of the screen.

[Claim 8]

The projection optical unit of Claim 4, wherein the optical axis of the image display element and the optical axis of the first projection optical unit are not eccentric.

[Claim 9]

The projection optical unit of Claim 1, wherein the aforementioned M1 is from 2 through 7.

[Claim 10]

The projection optical unit of Claim 1, wherein the first magnified image and the second magnified image are in an inverted correlation.

[Claim 11]

The projection optical unit of Claim 1, wherein the F value of the first projection optical unit is F1 and the F value of the second projection optical unit is F2 = F1 x M1.

[Procedure Revision 2]

[Name of document subject to revision]	Detailed Explanation
[Name of items subject to revisions]	0014
[Revision Method]	Modifications
[Details of revisions]	

[0014]

Since the first magnified image by the first projection optical unit is formed on the image display element side more than the image by the second projection optical unit, the F value of the second <u>projection optical unit</u> (the divergence angle of the light beam) is multiplied by the F value of the first <u>projection optical unit</u>, F1, and the magnification M1 of the first magnified image, F2 = F1 × M1. Consequently, F2 of the second projection optical unit can be taken large, making it advantageous for ultra-wide angle of field exceeding 90 degrees.

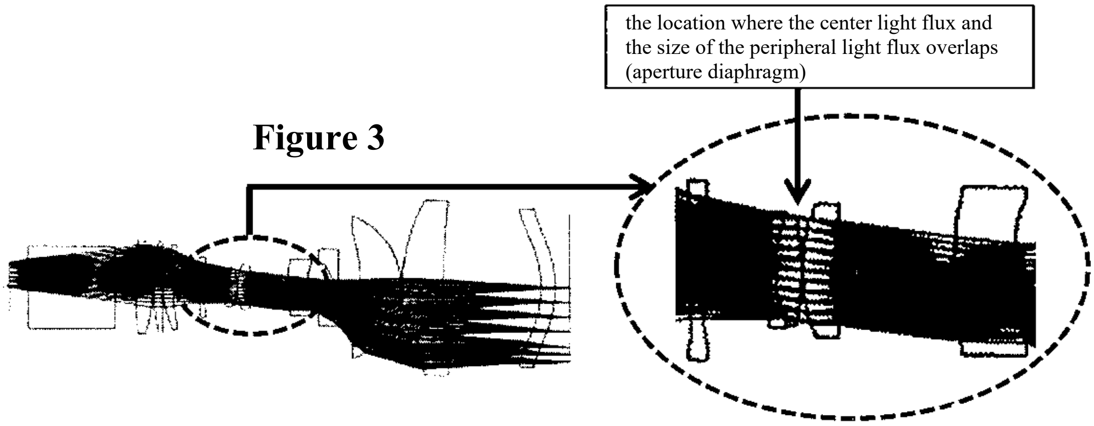
[Document name] Written Opinion
[Destination address] To : Examiner Makoto Inoue, Japan Patent Office
[Indication of the case]
[Application number] Japanese Patent Application 2010-289130
[Patent applicant]
[Identification number] 000005108
[Name or title] Hitachi, Ltd.
[Agent]
[Identification number] 100100310
[Patent Attorney]
[Name or title] Manabu Inoue
[Phone number] 03-4235-2473
[Dispatch No.] 515843
[Details of opinions]
Reasons
1. Examiner has authorized the reasons for refusing the application listed below. Therefore, Applicant revised the scope of the claims and the Detailed Explanation by the Procedure Revisions submitted on the same date as the Written Opinions. Below are the reasons:

2. About revisions
The perspective of Claim 2 was merged into Claim 1. Also, Claim 13 was deleted. Therefore, the numbers starting with Claim 2 were moved up, and the claims go up to 11 now.

3. Reasons for refusal
(Reason 1) The Detailed Explanation of this application does not provide any explanation as to what technical significance it has in "the first projection optical unit includes an aperture that specifies the F value of the entire projection optical unit", and the Detailed Explanation of the present invention of this application is not made in accordance with the provisions of the Ministry of Economy, Trade and Industry Ordinance for the present invention according to Claims 1 through 13 (in violation of Article 36 Paragraph 4 Item 1 of the Patent Act).
(Reason 2) The position of the aperture diaphragm is not specified in the drawings or in the lens data, and it is not clear whether "the first projection optical unit includes the aperture diaphragm that defines the F value of the entire projection optical unit" pertaining to the embodiment. The description of the situation concerning the early review explains that it is derived from Figure 3, Figure 33, and Table 1 that shows lens data, etc., but it should be explained in detail how it is derived (in violation of Article 36 Paragraph 6 Item 1 of the Patent Act).
(Reasons 1 and 3) The correlation between the first projection optical unit and the second projection optical unit and the first through third lens groups is not clear throughout the claims and Detailed Explanation. If you take into consideration Figure 33 and [0072], which are the configuration diagrams of the second projection optical unit, there would be first through third lens groups in the second projection optical unit. However, the description of F1 in [0014], which is the F value of the first lens group, and F2, which is the F value of the second group, are not consistent with the description of “F1, which is the F value of the first projection optical unit”, and “F2, which is the F value of the second projection optical unit” in Claim 12.
(Reason 3) With respect to Claim 13, it is unclear what "the second projection optical unit is aspherical" means (in violation of Article 36 Paragraph 6 Item 2 of the Patent Act).

4. Objections to reasons for the refusal
(1) First, (Reason 1) and (Reason 2) are explained.
The location of the aperture diaphragm is where the central flux and the size of the peripheral flux overlap, as shown in Figure 3, which shows the first projection optical unit.

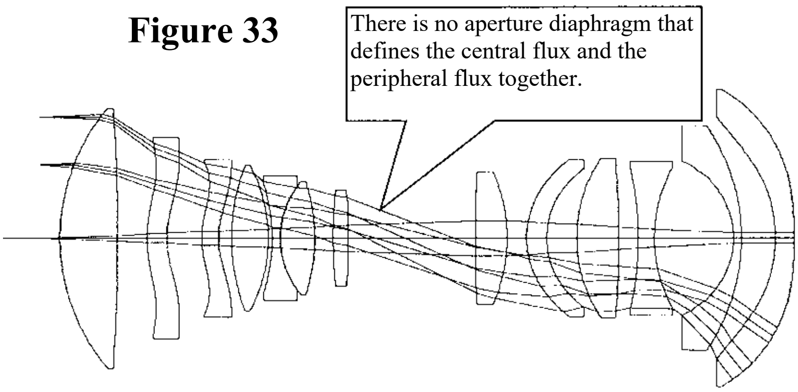
Figure 3



Here, when a light ray diagram of the second projection optical unit is created based on lens data (Table 1), Figure 33 that shows the second optical unit is as follows:

As shown in the drawing below, there is no overlap between the central flux and the peripheral flux, indicating that the second projection optical unit does not have an aperture diaphragm. For example, if an aperture diaphragm is placed based on the central flux, it would block a part of the peripheral flux, and if an aperture diaphragm is placed based on the peripheral flux, it would block a part of the central flux. However, this is not the case in the following drawing.

Figure 33



Thus, the first projection optical unit includes an aperture diaphragm that defines the incident ray flux to the second projection optical unit by the ray flux from the first projection optical unit. Thus, it includes an aperture diaphragm that defines the F value of the entire projection optical unit.

Here, placing an aperture diaphragm in the second projection optical unit also means placing a location where the central light flux and the size of the peripheral light flux overlap within the second projection optical unit. However, this would increase the constraints of the optical design of the second projection optical unit, leading to a larger second projection optical unit and an increased number of lenses.

On the other hand, by defining the incident ray flux to the second projection optical unit by the ray flux from the first projection optical unit, the placement of aperture diaphragm to the second projection optical unit can be avoided, and thus the overall large size of the projection optical system and the increase in the number of lenses can be avoided.

(2) Next, (Reasons 1 and 3) are explained:

As the description in Paragraph 0014 pointed out by Examiner is a typographical error, it was corrected. In other words, "F1, which is the F value of the first lens group", was corrected to "F1, which is the F value of the first projection optical unit", and "F2, which is the F value of the second group", was corrected to "F1, which is the F value of the second projection optical unit".

As one embodiment of the invention of the application pertaining to the present invention, it is stated that the second projection optical unit has multiple lens groups, but the description in Paragraph 0072 pointed out by the examiner indicates the classifications of lens groups within the second projection optical unit, and it is not related to the description in Paragraph 0014.

It should be noted that the revisions in Paragraph 0014 are not considered to be revisions beyond the scope stated in the Detailed Explanation, as it can be seen that they are merely typographical errors by reference to the description in Paragraph 0027.

(3) Claim 13 shown in (Reason 3) has been deleted.

5. As stated above, all reasons for the refusal are believed to have been resolved. We humbly ask you to re-examine and make a decision to grant the patent of this application.

6. If there is any question pertaining to the Written Opinions, or if the Written Opinions do not change your reasons for the refusal, we would like to present an oral technical explanation of the invention of this application.

End

Decision of Refusal

Patent Application Number	Japanese Patent Application 2010-289130
Drafting Date	November 02, 2011
Patent Office Examiner	Makoto Inoue 3309 2V00
Name of Invention	Projection optical unit
Patent Applicant	Hitachi, Ltd.
Attorney	Manabu Inoue

Application Date (Retroactive Date) November 28, 2003

This application should be refused for Reason 1 described in the Notice of Reasons for Refusal dated July 27, 2011.

We examined the detail of the Written Opinions and Procedure Revision, but we cannot find sufficient grounds to overturn the reasons for the refusal.

Remarks:

In the Written Opinions, Applicant asserts from Figures 3, 33, Table 1, etc. that the first projection optical unit includes an aperture diaphragm that defines the incident light flux to the second projection optical unit by the light flux from the first projection optical unit. Thus, it includes an aperture diaphragm that defines the F value of the entire projection optical unit, and by defining the incident light flux to the second projection optical unit by the light flux from the first projection optical unit, the placement of the aperture diaphragm to the second projection optical unit can be avoided. Therefore, the overall large size of the projection optical system and the number of lenses can be avoided.

However, the Detailed Explanation of this application has no description of aperture diaphragm, including lens data and lens configuration diagrams. Even if the first projection optical unit is guided to include an aperture diaphragm in an embodiment, it is not clear from which description of the Detailed Explanation of this application for the present invention can be read that it is due to the reasons as asserted above. In general, regardless of whether or not the aperture diaphragm is focused on, it is not possible to read that the technical significance of the aperture diaphragm is disclosed as an invention from the description of the Detailed Explanation of this application, in which the aperture diaphragm is neglected to the extent that the description is omitted, even though the position of the aperture diaphragm is usually stated in the lens data and lens composition diagram.

Therefore, the above assertions are not based on the description of the Detailed Explanation of this application and cannot be adopted.

If you are not satisfied with this assessment, you may appeal to the Commissioner of the Japan Patent Office (Article 121 Paragraph 1 of the Patent Act) within three (3) months from the date of service of the copy of this assessment (or within four (4) months for foreigners).

(Instructions based on Article 46 Paragraph 2 of the Administrative Cases Law)

No cancellation action can be filed against this assessment. A cancellation action may be filed only in response to a decision made on an appeal pertaining to this assessment (Article 178.6 of the Patent Act).

Director/Deputy Director	Head Examiner/Deputy Head Examiner	Examiner	Assistant Examiner
	[Tetsu] Toyoo	Makoto Inoue	
	9024	3309	

[Document name]	Request for Appeal
[Destination address]	To: Director General of Japan Patent Office
[Indication of appealed case]	
[Application number]	Japanese Patent Application 2010-289130
[Type of appeal]	A case of appeal on the decision to refuse
[Number of claims]	11
[Appellant]	
[Identification number]	000005108
[Name or title]	Hitachi, Ltd.
[Agent]	
[Identification number]	100100310
[Patent Attorney]	
[Name or title]	Manabu Inoue
[Phone number]	(omitted)
[Indication of fees]	
[Prepayment ledger number]	013088
[Amount of payment]	110000
[Purpose of claims]	We request that your original decision be cancelled and that the present invention of this application be patented.

[Reasons for claims]

1. Background of procedures

Japanese Patent Application	December 27, 2010
Request for review	December 27, 2010
Written Report	December 27, 2010
Procedure Revision	December 27, 2010
Written explanation for the early review	May 30, 2011
Procedure Revision	May 30, 2011
Notice of Reasons for Refusal	August 02, 2011 (date sent)
Written Opinion	September 30, 2011

Procedure Revision September 30, 2011
Decision of Refusal November 08, 2011 (date sent)

2. Key points on the decision to refuse

The Detailed Explanation for this application contains no description of an aperture diaphragm, including lens data and diagrams for lens composition.

3. The reason why the present invention of this application should be patented

Claims 11 and 25 that are within the scope of the claims originally attached to the application have a description on an aperture diaphragm. Thus, Applicant has revised Paragraph 0013 of the Detailed Explanation based on the said description.

Therefore, the decision to refuse is believed to have been resolved.

4. As explained above, we believe that the decision to refuse has been resolved. We humbly ask you to review the application again and decide in favor of granting the patent for this application.

End

[Inventory of submitted items]

[Inclusive Power of Attorney Number] 0315335

[Document name] Procedure Revision
[Destination address] To: Director General of Japan Patent Office
[Indication of the case]
[Application number] Japanese Patent Application 2010-289130
[Person making revisions]
[Identification number] 000005108
[Name or title] Hitachi, Ltd.
[Agent]
[Identification number] 100100310
[Patent Attorney]
[Name or title] Manabu Inoue
[Phone number] 03-4235-2473
[Dispatch No.] 759041
[Procedure Revision 1]
[Name of document subject to revision] Detailed Explanation
[Name of items subject to revisions] 0013
[Revision Method] Modifications
[Details of revisions]
[0013]

Also, a field lens group having a positive refractive power is placed between the first and <u>second</u> projection optical units to reduce the magnification M1 of the <u>first</u> magnified image to less than the magnification M2 of the <u>second</u> magnified image. Also, the <u>first</u> projection optical unit is preferably telecentrically designed to match the F value of the projection optical system on the side of the image display element. <u>In addition, the first projection optical unit is preferably provided with an aperture diaphragm that defines the F value of the entire projection optical unit.</u>

[Document name] Written Response
[Destination address] To: Examiner Kiyonobu Kitagawa, Japan Patent Office
[Indication of appealed case]
[Appeal No.] Objection 2012 - 2094
[Application number] Japanese Patent Application 2010-289130
[Appellant]
[Identification number] 000005108
[Name or title] Hitachi, Ltd.
[Agent]
[Identification number] 100100310
[Patent Attorney]
[Name or title] Manabu Inoue
[Phone number] (omitted)
[Dispatch No.]
083253
[Details of the responses]
Reasons
1. In the Reconsideration Report, Examiner stated the following opinions: Applicant then provides responses to the said content.

2. Details of the Preliminary Report

We believe that the details of the Preliminary Report can be summarized as follows:

(1) Appellant added the description that reads, "Furthermore, the first projection optical unit is preferably provided with an aperture diaphragm that defines the F value of the entire projection optical unit", but it is still not possible to read the technical significance of "the first projection optical unit includes an aperture diaphragm that defines the F value of the entire projection optical unit" from the Detailed Explanation of this application.

(2) Cited Literature 1 does not read that "the magnification M1 of the first magnified image for the image displayed in the image display element is smaller than the magnification M2 of the second magnified image for the first magnified image" or that "the first projection optical unit includes an aperture diaphragm that defines the F value of the entire projection optical unit", but these are matters that a person skilled in the art would design as appropriate. Even if the Detailed Explanation

of this application is taken into consideration, no particular effect is found from the above configuration.

(3) In contrast to the inventions according to Claims 3 through 6 and Claim 8 of this application and the inventions according to Claims 1 through 4 of Patent Application 2, it has been identified that “the first projection optical unit includes an aperture diaphragm that defines the F value of the entire projection optical unit”, whereas the inventions according to Claims 1 through 4 of Patent Application 2 differ in that it is not specified. However, placing the aperture diaphragm in an appropriate position in the optical system is a common knowledge technique, and the above difference is only a small difference in design.

(4) The invention according to Claim 4 of this application cites Claim 4 and does not cite the preceding claims. Therefore, the description in Claim 4 was not made in accordance with the provisions of the Ministerial Ordinance on Economy, Trade and Industry.

3. Objections to Reconsideration Reports

Of (1) through (4) above, concerning (1) through (3), if the technical significance of 'the first projection optical unit includes an aperture diaphragm that defines the F value of the entire projection optical unit' is revealed, the reason for refusal is considered to be resolved.

This is not a matter that a person skilled in the art could design as appropriate. The present invention of this application features the placement of an aperture diaphragm that defines the F value of the entire projection optical unit in the first projection optical unit rather than in the second projection optical unit.

Placement of an aperture diaphragm (where the central flux and the size of the peripheral light flux overlaps) in the second projection optical unit (a unit that further magnifies the intermediate images formed by the first projection optical unit to achieve wide angulation) increases the constraints of the optical design of the second projection optical unit. In other words, it will lead to a larger second projection optical unit/increased number of lenses. Conversely, by specifying the incident light from the first projection optical unit to the second projection optical unit, there is no need to place an aperture diaphragm within the second projection optical unit. Thus, the increase in the overall size of the projection optical unit and the number of lenses can be avoided.

Since the first projection optical unit has a small percentage of image magnification, placing an aperture diaphragm within the unit does not significantly increase the optical design constraints of the first projection optical unit.

Next, (4) above is explained. "Described in Claim 4" is an error, and it should read " described in Claim 3". If we could have an opportunity to make corrections, we would like to make corrections.

4. As stated above, all reasons for the refusal are believed to have been resolved. We humbly ask you to review the application again and decide in favor of granting the patent for this application.

End

Notice of Reasons for Refusal

Appeal Request Number (Number of Patent Application)	Objection 2012 - 2094 (Patent Application 2010-289130)
Drafting Date	December 07, 2012
Chief Examiner, Examiner, Japan Patent Office	Masaya Ito
Appellant	To Hitachi, Ltd.
Patent Attorney	Dear Mr. Manabu Inoue,

The application for this appeal should be refused as a result of the consultation for the following reasons: If you have any comments on this, please submit your Written Opinions within sixty (60) days from the date this notice is sent.

Reasons

1. Background of procedures

The present application for an appeal is a new patent application filed with part of patent application 2003-398395 on November 28, 2003, and the reason for the refusal was notified on July 27, 2011. Written Opinions were submitted on September 30, 2011, and Procedure Revision was submitted on the same day, after which a decision to refuse the application was made on November 02 of the same year. In response to this, a request for a decision was made on February 03, 2012 against the decision to refuse the application, and at the same time, Procedure Revision was made.

2. Novelty and inventiveness

1. Invention of the present application

The inventions according to Claims 1 through 11 of the claims of this application (hereinafter referred to as "Inventions 1 through 11 of this application") are as follows, as specified by the matters described in Claims 1 through 11 of the claims revised by Procedure Revision dated September 30, 2011.

Invention 1 of this application

"A projection optical unit for magnifying and projecting an image displayed on an image display element:

a first projection optical unit having a positive refractive power for magnifying the image displayed on the image display element to form a first magnified image; and

a second projection optical unit having a positive refractive power for further enlarging the first magnified image to form a second magnified image;

Wherein the first magnified image is formed on the side of the image display element more than the second projection optical unit;

wherein magnification M1 of the first magnified image for the image displayed in the image display element is less than magnification M2 of the second magnified image for the first magnified image;

wherein the first projection optical unit comprises an aperture diaphragm that defines the F value for the entire projection optical unit".

Invention 2 of this application
“The projection optical unit of Claim 1, wherein the first projection optical unit is in a nearly telecentric correlation with the image display element side of the first projection optical unit and the first magnified image side, and wherein the first magnified image is telecentrically formed.”
Invention 3 of this application
“The projection optical unit of Claim 1, wherein the optical axis of the second projection optical unit is eccentric with respect to the optical axis of the first projection optical unit.” (“the second projection optical unit” and “the first projection optical unit” of Claim 3 are determined to be typographical errors and they should read “the second projection optical unit” and “the first projection optical unit”, respectively.)
Invention 4 of this application
“The projection optical unit of Claim 3, wherein the optical axis of the second projection optical unit is eccentric with respect to the optical axis of the first projection optical unit so that the optical axis of the second projection optical unit is offset from the center of the screen.” (“The second projection optical unit”, “the first projection optical unit”, and “the description of Claim 4” are determined to be typographical errors and they should read “the second projection optical unit”, “the first projection optical unit”, and “the description of Claim 3”, respectively.)
Invention 5 of this application
“The projection optical unit of Claim 4, wherein the second projection optical unit is eccentric with respect to the first enlarged image.” (“The second projection optical unit” of Claim 5 is determined to be a typographical error and should read “the second projection optical unit”.)
Invention 6 of this application
“The projection optical unit of Claim 4, wherein the optical axis of the image display element and the optical axis of the first projection optical unit are not eccentric.” (“The first projection optical unit” of Claim 6 is determined to be a typographical error and should read “the first projection optical unit”.)
Invention 7 of this application
“The projection optical unit of Claim 5, wherein the optical axis of the second projection optical unit is eccentric in a direction above the center of the screen relative to the optical axis of the first projection optical unit.” (“The second projection optical unit” and “the first projection optical unit” of Claim 7 are determined to be typographical errors and should read “the second projection optical unit” and “the first projection optical unit”, respectively.)
Invention 8 of this application
“The projection optical unit of Claim 4, wherein the optical axis of the image display element and the optical axis of the first projection optical unit are not eccentric.” (“The first projection optical unit” of Claim 8 is determined to be a typographical error and should read “the first projection optical unit”.)
Invention 9 of this application
“The projection optical unit of Claim 1, wherein M1 is 2 through 7.”
Invention 10 of this application
“The projection optical unit of Claim 1, wherein the first magnified image and the second magnified image are in an inverted correlation.”
Invention 11 of this application
“The projection optical unit of Claim 1, wherein F2 = F1 x M1 if the F value of the first projection optical unit is F1, and the F value of the second projection optical unit is F2.”

2. Citated Publications

The following items are described in WO 02/21851 (hereinafter referred to as "Citation 1"), a publication cited in the Reconsideration Report distributed prior to the application of this Application: (As a tentative translation, the special bulletin 2004-508779 (hereinafter referred to as “Citated Literature 1’”), which is the family literature of Cited Literature 1, was adopted. Furthermore, the underlines were added by Examiner.)

(a) “This projection system is designed to be extremely compact to accommodate very limited space within Casing 140 and Dome 195. At the same time, it has the desired image magnification (x 20, for example) and resolution. The projection system is also designed to relay the above light beams from a stationary light source to a moving screen. One embodiment of such an optical projection system will be described in detail below.

When referring to Figures 2A and 2B, Front-end Optical Components 200 are mounted on Base 110 of Display 100 below Platform 160 (see Figure 1). Figures 2A and 2B also show a portion of Projection Engine 120 (see Figure 1). The projection engine includes a light source and a homogenizing and collimating optical element that delivers broadband light rays to Prism Assembler 210. Prism Assembler 210 separates light rays into three primary color components (i.e. red, green, and blue) and directs each component to Spatial Light Modulator (SLM) 220 (only one is shown). These SLMs are microelectromechanical system (MEMS) arrays of switchable micromirrors (e.g., Texas Instruments’ DMDTM) capable of generating images of XGA resolution (1024 x 786) at the frequency of at least about 4 kHz. Each SLM spatially modulates each incident light beam to produce red, green, or blue component images. These images are recombined inside Prism Assembler 210 to form a single full color image (eight colors) and exit the projection engine on Surface 225.

Projection Engine 120 directs light rays toward Telecentric Relay Lens System 230. This relay lens system includes three doublet lenses 235, 236, and 237. Relay Lens System 230 images the SLM 220 in an intermediate image at a location about 600 millimeters away from the projection engine. The magnification of this intermediate image is 3.8 times, and the image is similarly formed between two Field Lenses 240 and 250, which are doublet lenses. The functions of these field lenses are described below.

Relay Lens System 230 images the SLM in an intermediate image so that the optical distance and image magnification are within the constraints imposed by the display housing. The direct imaging of the SLM on the projection screen should require a much longer optical distance than the present embodiment. This is due to a large amount of glass being used in Prism Assembler 210 between SLM 220 and the optical projection system. When imaged from the intermediate image to the projection screen, the projection optical element can be positioned close to the intermediate image, and the optical distance can be significantly shortened. Front-end Optical Element 200 includes Tri-fold Mirrors 260, 270, and 280. These mirrors fold the projected optical path to accommodate the optical path within the stereoscopic interior of the display device casing. Mirrors 260, 270, and 280 also direct light rays toward Mirror 290, which is located on Axis 170 and directs light rays from the plane of Base 110 (see Figure 1) to the exterior and along the axis of Rotation 170 to the projection lens. In the projection lens, Rotation Axis 170 is consistent with the optical axis of the projection system. Foldable Mirrors 260 and 270 can be manually adjusted during operation to allow the user to accurately align the image to the center of the projection screen.

Referring to Figure 3, Projection Lens 310 focuses light rays through Annular Shaft 320 of Frameless DC Motor 330. Projection Lens 310 and Mirrors 340, 350, and 360 together configure the backend of the optical projection system. Mirrors 340, 350, and 360 are mounted on Platform 160 (see Figure 1) and flex the optical path of the light beam to accommodate the optical path inside Dome 195 (see Figure 1). Projection Lens 310 directs the light rays toward Mirror 340; Mirror 350 directs the light rays toward Mirror 360; Mirror 350 directs the light rays toward Mirror 360; and Mirror 360 directs the light rays toward Projection Screen 190 to form an enlarged image of SLM in Region 370. Image Region 370 spans about 10 inches in diameter and corresponds to 20 times the image in SLM. The SLM image is trimmed to the resolution of 768 x 768 pixels. As described above, in operation, Motor 330 rotates the backend projection optical element (in other words, Projection Lens 310 and Mirrors 340, 350, and 360) around Axis 170.

Referring to Figure 4, Projection Lens 310 includes a triplet lens assembly device consisting of Lenses 410, 420, and 430. Lenses 410, 420, and 430 are coaxially aligned along Lens Axis 440. Lens Axis 440 is inclined about 10 degrees or less (e.g., approximately 4. 94°) at Angle 450, and this optical axis coincides with Rotation Axis 170 at this point. The light beam enters Projection Lens 310 via Lens 410 and is focused at the waist near Lens 420. On the first surface of Lens 410, Lens Axis 440 is approximately 5. 9 mm displaced from the optical axis. In order for the light beam to pass through the opening of Motor 330 (see Figure 3), it is necessary to focus the light beam on the waist. The light beam exits Projection Lens 310 via Lens 430. The purpose of designing the projection lens in this way becomes apparent when the optical passages of the projection system are deployed.

Referring to Figure 5, which shows the deployed optical passage, Projection Screen 190 is angled at 45 degrees relative to Optical Axis 510 of the projection system. This is why Projection Lens 310 is inclined relative to Optical Axis 510. When the projection lens is inclined, the plane of the image is inclined by a predictable amount (given by the so-called shyimflug (original word: Scheimflug) condition). This reduces distortion caused by projection of the image to a plane not orthogonal to the optical axis. Inclination Angle 450 is determined by the angle between the plane of the projection screen and the optical axis, and these two angles are not limited to the angles described above.

Projection Lens 310 provides to the image an optical aberration, such as a negative image plane curvature, a negative axial color, and a lateral color (originally referred to as lateral color). Prism Assembly Device 210 (see Figure 2) also provides an aberration in the image. These aberrations are partially compensated by Relay Lens 230 and Field Lenses 240 and 250. Three Doublet Lenses 235, 236, and 237 are used for Relay Lens 230 to minimize the magnification of the relay lens to reduce aberration. Doublets are used to minimize the dispersion effect of each component. At least one doublet is a doublet with a high refractive index (original word: index), which increases the axial color and image plane curvature to compensate for the aberration caused by Projection Lens 310. Field Lenses 240 and 250 are also doublet lenses, which maintain telecentricity (original word: telecentricity) at the location of the intermediate image at the location of the intermediate image formed on Plane 520. First Doublet Lens 240 is located about 30 mm in front of Intermediate Image Plane 520 and corrects the incident light to be near-telecentric (originally near-telecentric). Additionally, Lens 240 also reduces axial color and image plane curvature. Second Doublet Lens 250 is located about 30 mm past Intermediate Image Plane 520, resulting in a positive image plane curvature and axial color and overcompensating for correction of Lens 240. The image curvature and net contribution to axial and transverse colors provided by Lenses 235, 236, 237, 240, and 250 compensate for the opposite effect provided by Projection Lens 310. At Projection Screen 190, the blue and green images overlap, while the red images are displaced axially. As System F number is set to be low on the projection screen, the depth of focus is large. Due to the compensating contribution of the projection lens and other lenses to the image plane curvature, this aberration is designed to be an inclined plane rather than a curved surface. Also, the astigmatism of the image is low, and the horizontal color is minimal. Image distortion is normal trapezoidal distortion, and the residual thread-wound distortion is less than 2 percent. The image quality on the projection screen can sufficiently resolve 40 pixels per millimeter resolution of the SLM. This resolution corresponds to about 2 pixels per millimeter in the projection screen.

The software pre-distorts the image to compensate for the trapezoidal effect in the image plane. The software also compensates for the rotational display of the axis of motion of the image by rotating the image data in the opposite direction. The reason for the rotational representation of the axis of motion of the image (i.e., the rotation of the image in the plane of the projection screen) is that the front-end optical element displays the fixed image on the projection screen that rotates."
(Cited Literature 1, Page 5 Line 29 to Page 8 Line 27 (Cited Literature 1 Paragraphs[0030]-[0039]))

(b)

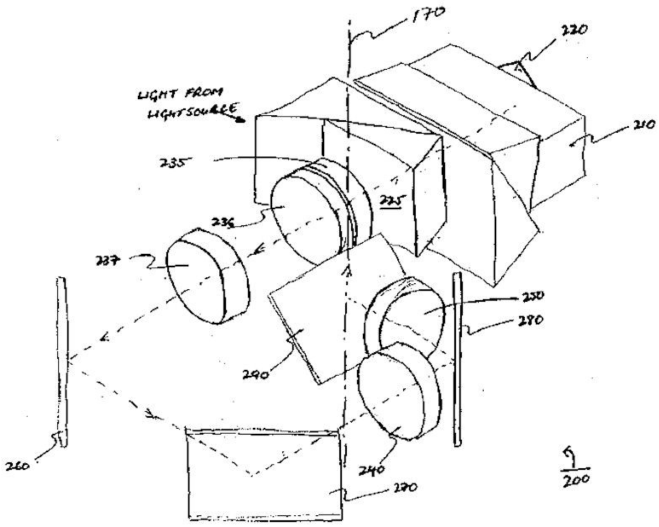


FIG 2A

(c)

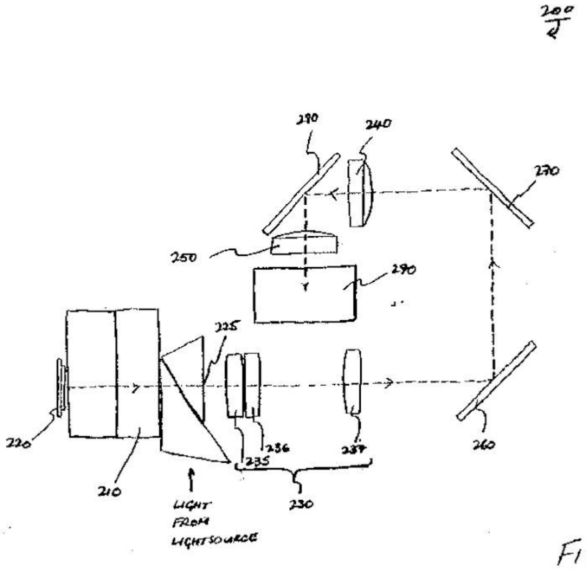


FIG. 2B.

(d)

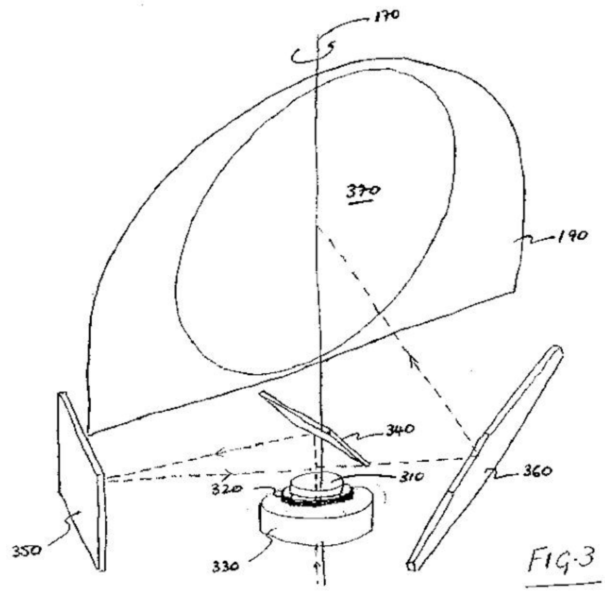


FIG. 3

(e)

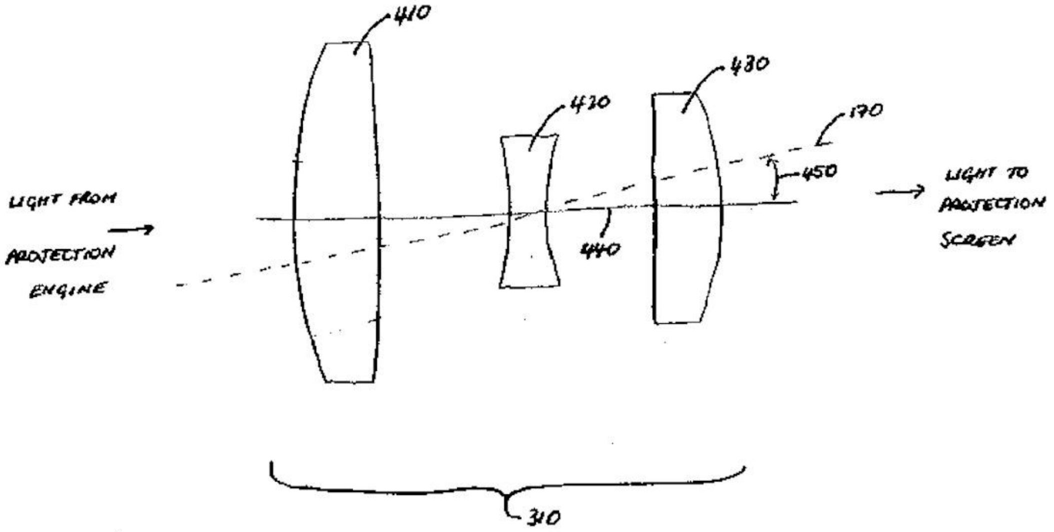


FIG. 4

(f)

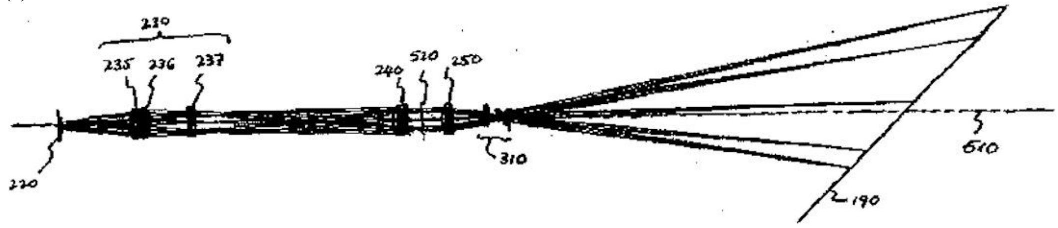


FIG. 5

From the description reading “The magnification of this intermediate image is 3. 8 times”, and from the description that reads, "SLM magnification is formed in Region 370. Image Region 370 is described as ... approximately equaling 20 times the image in the SLM”, it is clear that “magnified image” is 5. 26 times (= 20 times/3. 8 times) larger than the “intermediate image”.

In addition, since it is common technical knowledge that the telecentric optical system has an aperture diaphragm, it is clear that the "Telecentric Relay Lens System 230" described above has an aperture diaphragm.

In addition, from the facts that the above description reads, "Rays focus on the waist near Lens

420 by entering Projection Lens 310 via Lens 410" and that "Lens 410" has a telecentric incidence of light, it is clear to those skilled in the art that "Projection Lens 310" does not have an aperture diaphragm.

Therefore, based on the matters described in Cited Literature 1 above and common technical knowledge, Cited Literature 1 refers to the following invention (hereinafter referred to as "Cited Invention 1").

"A projection system that comprises of Telecentric Relay Lens System 230 and Field Lens 240, wherein the image generated by Spatial Light Modulator 220 is formed as an intermediate image at the magnification of 3.8 times;

and Projection Lens 310 and Field Lens 250, wherein the aforementioned intermediate image is formed

between Field Lens 240 and Field Lens 250; and

wherein Telecentric Relay Lens System 230 has an aperture diaphragm, and Projection Lens 310 does not have an aperture diaphragm."

3. Concerning Invention 1 of this application,

Invention 1 of this application and Cited Invention 1 are compared.

(a) As the "Projection System" having "Telecentric Relay Lens System 230 and Field Lens 240" and "Projection Lens 310 and Field Lens 250" of Cited Invention 1 projects "images generated by Spatial Light Modulator (SLM) 220" that are magnified to "Magnified Images" at the magnification of 20 times (= 3.8 times × 5. 26 times), it corresponds to the "projection optical unit that magnifies and projects the image displayed on the image display element" of Invention 1 of this application.

(b) As it is clear that "Telecentric Relay Lens System 230 and Field Lens 240" of Cited Invention 1 "form" "images generated by Spatial Light Modulator (SLM) 220 as intermediate images" and that they have a positive refractive power, "Telecentric Relay Lens System 230 and Field Lens 240 that form the images generated by Spatial Light Modulator (SLM) 220 at the magnification of 3.8 times" of Cited Invention 1 correspond to the "first projection optical unit with positive refractive power to magnify images displayed on the aforementioned image display element to generate the first magnified image" of Invention 1 of this application. In the same manner, "Projection Lens 310 and Field Lens 250 that form the aforementioned intermediate images at the magnification ratio of 5.26 times" of Cited Invention 1 correspond to the "second projection optical unit with positive refractive power to further magnify the first magnified images to form second magnified images" of Cited Invention 1 of this application.

(c) The structure in which "the aforementioned intermediate images are formed between Field Lens 240 and Field Lens 250" of Cited Invention 1 corresponds to the structure in which "the first magnified images of Invention 1 of this application are formed on the image display element side more than they are on the second projection optical unit side".

(d) As the structure wherein "Telecentric Relay Lens System 230 and Field Lens 240" of Cited Invention 1 "forms images at the magnification of 3.8 times" and "Projection Lens 310 and Field Lens 250" "form images at the magnification of 5.26 times" can be expressed as "3.8 times" < "5.26 times" the magnification M1 of the first magnified images for the images displayed on the aforementioned image display element of Invention 1 of this application correspond to a structure in which "M1, the magnification rate of magnifying the images displayed on the aforementioned image display element to the aforementioned first magnified images is smaller than the magnification rate of M2 for the second magnified images against the aforementioned first magnified images".

(e) It is clear that "Telecentric Relay Lens System 230" has an aperture diaphragm in Cited Invention 1, and "Telecentric Relay Lens System 230" does not have an "aperture diaphragm" in

Projection Lens System 310. Therefore, “Telecentric Relay Lens System 230” of Cited Invention 1 has an aperture diaphragm and the Projection Lens 310] does not have an aperture, which corresponds to the "the first projection optical unit includes an aperture diaphragm that defines the F value of the entire projection optic unit”.

Thus, both

“A projection optical unit for magnifying and projecting an image displayed on an image display element:

a first projection optical unit having a positive refractive power for magnifying the image displayed on the image display element to form a first magnified image; and

a second projection optical unit having a positive refractive power for further enlarging the first magnified image to form a second magnified image;

Wherein the first magnified image is formed on the side of the image display element more than the second projection optical unit;

wherein magnification M1 of the first magnified image for the image displayed in the image display element is less than magnification M2 of the second magnified image for the first magnified image;

are consistent in that the first projection optical unit comprises an aperture diaphragm that defines the F value for the entire projection optical unit”, and there is no difference between the two.

Therefore, since Invention 1 of this application is Cited Invention 1, it falls under Article 29 Paragraph 1 Item 3 of the Patent Act. Therefore, a patent right cannot be granted.

4. Invention 2 of this application

(1) Cited publications

(a) From the description that reads, "Telecentric Relay Lens System 230" and "Field Lenses 240 and 250" of the above described matters in Cited Literature 1 are also doublet lenses, and the telecentricity of the intermediate images formed on Plane 520 are maintained” and the description in Figure 5, it is clear that “Telecentric Relay Lens System 230” is telecentric on the imaging side and that it is a structure in which "intermediate images" are telecentrically formed.

Therefore, Cited Literature 1 describes the following invention (hereinafter referred to as "Cited Invention 2").

“A projection system that comprises of Telecentric Relay Lens System 230 and Field Lens 240, wherein the image generated by Spatial Light Modulator 220 is formed as an intermediate image Telecentric Relay Lens System 230 and Field Lens 240 that are telecentric on the imaging side and are formed at the magnification of [text missing] 8; and magnification;

and Projection Lens 310 and Field Lens 250, wherein the aforementioned intermediate image is formed

the intermediate images are telecentrically imaged and formed between Field Lens 240 and Field Lens 250;

wherein Telecentric Relay Lens System 230 has an aperture diaphragm, and Projection Lens 310 does not have an aperture diaphragm.”

(b) Publications distributed prior to the filing of this application, JP 2001-208968 (hereinafter referred to as "Cited Literature 2"), describes the following: (The underlines were added by Examiner.)

(a) "[0028] The light reflected in DMD 33 (cross-sectional image) is parallelized by Intermediate Optical System 511 and passes through Image Rotation Compensation Mechanism 34 to compensate for rotation of the cross-sectional images. Then, the light flux that is rotationally compensated in Image Rotation Compensation Mechanism 34 is eventually projected onto the major surface (projection surface) of Screen 38 via Projection Mirror 36, Projection Lens 513, and Projection Mirror 37. Accordingly, processing and Projection Optics 50 and DMD 33 sequentially generate plural cross-sectional images based on the two-dimensional image data and form a projection image-generation means for sequentially projecting plural cross-sectional images onto the screen in synchronization with the rotational scan of Screen 38.

(b) "[0049] The light (cross-sectional image) of each of R, G, and B components produced in each region of DMD 33 is parallelized by a bilateral Telecentric Optical System 511a through TIR Prism 44. The light (cross-sectional image) of each component of R, G, and B that has become parallel light forms three different optical paths. For example, as shown in Figure 7, three parallel lights are formed: the light of the R component passes through the upper side of the light of the G component, and the light of the B component passes through the lower side of the light of the G component".

(c) "[0057] < D. As explained above, bilateral telecentric optics: In this embodiment, Bilateral Telecentric Optical System 511a is provided as an imaging optical system of the equal magnification in Intermediate Optical System 511, but this optical system is telecentric for the following reasons.

[0058] On the Display Element (DMD33) side (reduced side in the magnified optical system), the light reflected by DMD 33 needs to be telecentric (telecentric on the object side) by the optical system (hereinafter referred to as "processing optical system") so that it does not get declined by the optical system.

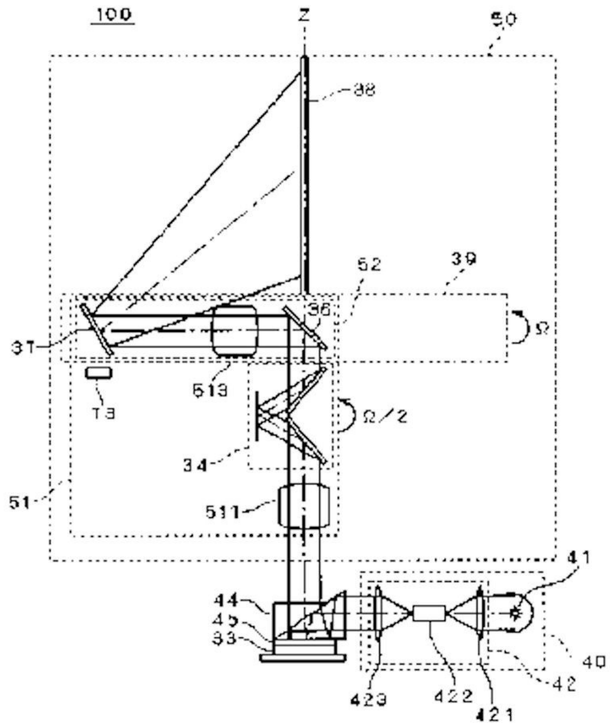
[0059] In addition, the side forming the intermediate images (the enlargement side in the enlargement optical system) is preferably telecentric (telecentric on the imaging side) in order to relay to Projection Optical System 52 without losing the amount of light and to eliminate the need for condenser lenses when it enters Projection Optical System 52".

(d) "[0061] Due to such circumstances, this optical system is configured to be telecentric on both sides. In this embodiment, Optical Path Length Regulators 511b and 511c, Dichroic Mirrors 511d and 511e, Mirrors 511f and 511g, and Image Rotation Compensation Mechanism 34 fall under the processing optical system.

(e) "[0067] Moreover, Bilateral Telecentric Optical System 511a having such a performance, specifically any one of Bilateral Telecentric Optical System 511a1 through 511a6 described below is configured so that the focal point of the display element side is located on the surface of DMD 33 and that the focal point of the side forming the intermediate images is located at or near the location of light entrance to each of the processing optical systems described above".

(f)

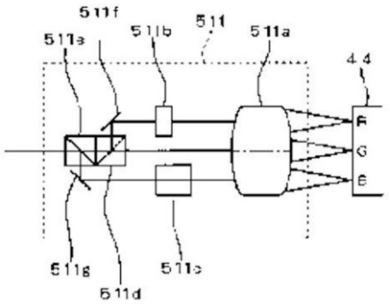
[Figure 2]



(g)

[Figure 7]

[illegible]



(2) Comparison between Invention 2 of this application and Cited Invention 2

The "intermediate image" of Cited Invention 2 corresponds to the "first" magnified image of Invention 2 of this application being telecentrically formed.

Given this, in Invention 2 of this application, "the first projection optical unit has a nearly telecentric correlation with the image display element side of the first projection optical unit and the first magnified image side", and it is different in that "Telecentric Relay Lens System 230 and Field Lens 240" are "telecentric on the imaging side in Cited Invention 2".

(3) Decision

The above differences are evaluated.

In Cited Invention 2, “Telecentric Relay Lens System 230 and Field Lens 240” are “telecentric on the imaging side”, but it is not telecentric on the object side. In addition, it is clear that the structure in which “the first projection optical unit” of Invention 2 of this application is substantially telecentric in a correlation to the image display element side and the first magnified image side of the first projection optical unit. In other words, “the first projection optical unit” is substantially telecentric on both sides.

Cited Literature 2 discloses a technical matter, in which the “intermediate images” by “Intermediate Optical System 511a” are projected on to “Screen 38” by the “light reflected by DMD 33 (cross-sectional image)” using “Projection Lens 513”, and “Intermediate Optical System 511a” is used as a bilateral telecentric optical system. In addition, Cited Literature 2 describes the technical matter that it is preferable to be telecentric on the object side since “the processing optical system” does not cause the light from “DMD 33” to be diffracted. In addition, Cited Literature 1 describes the technical matter of placing the optical system “Spatial Light Modulator (SLM) 220” on the side of “Telecentric Relay Lens System 230 and Field Lens 240”, so that the light from Spatial Light Modulator (SLM) 220 is not diffracted.

In addition, the effects that can be achieved by Invention 2 of this application are within the scope that a person skilled in the art would expect from the technical matters described in Cited Invention 2 and Cited Literature 1 and Cited Literature 2, and they are not exceptional.

Therefore, Invention 2 of this application could readily have been invented by a person skilled in the art based on the technical matters described in Cited Invention 2, Cited Literature 1, and Cited Literature 2. Therefore, a patent right cannot be granted pursuant to the provisions of Article 29 Paragraph 2 of the Patent Act.

5. Inventions 3 through 8 of this application

(1) Cited publications

From the afore-mentioned matters of Reference 1, it is obvious that the optical axis of “Telecentric Relay Lens System 230 and Field Lens 240” matches the optical axis of the projection system. Moreover, since Projection Lens 310 is a structure that is inclined relative to the optical axis of the projection system, it is clear that the optical axis of “Projection System 310” is a structure that is inclined relative to the optical axis of “Telecentric Relay Lens System 230 and Field Lens 240”.

Therefore, Cited Literature 1 describes the following invention (hereinafter referred to as “Cited Invention 3”):

“A projection system that comprises of Telecentric Relay Lens System 230 and Field Lens 240, wherein the image generated by Spatial Light Modulator 220 is formed as an intermediate image at the magnification of 3.8 times;

The intermediate images are [text missing] magnified images 5.[text missing] the aforementioned intermediate image is formed

Intermediate images are formed between Field Lens 240 and Field Lens 250.

The optical axis of Projection Lens 310 is inclined relative to the optical axis of Telecentric Relay Lens System 230 and Field Lens 240.

wherein Telecentric Relay Lens System 230 has an aperture diaphragm, and Projection Lens 310 does not have an aperture diaphragm.”

(2) Comparison of Inventions 3 through 8 of this application and Cited Invention 3

In inventions 3 through 8 of this application, “the optical axis of the first projection optical unit” and “the optical axis of the second projection optical unit” are “eccentric”, while “the optical axis of Projection Lens 310 in Cited Invention 3 of this application is inclined relative to the optical axis of Telecentric Relay Lens System 230 and Field Lens 240”.

(3) Decision

The above differences are evaluated.

In the projection device in general, when the optical axis of the projection system is not perpendicular to the screen, the projected images are distorted into a trapezoidal shape, and the distortion is corrected by a configuration that eccentricizes a part of the projection system. The optical axis of Projection Lens 310 of Cited Invention 3 is well known as shown in the Japanese Unexamined Patent Application Publication No. H2-287586 (see “Abstract of the Invention”, etc.), Japanese Unexamined Patent Application Publication No. H10-133101 (see “Abstract”, Paragraphs [0005] - [0006], etc.), Japanese Unexamined Patent Application Publication No. H11-231213 (see “Abstract”, etc.), and Japanese Unexamined Patent Application Publication No. H2000-155288 (see [Overview] Paragraph [0023]).

In addition, in such a case, which one among “Telecentric Relay Lens System 230, Field Lens 240”, and “Projection Lens 310” is decenterized to what extent is to be designed by a person skilled in the art as appropriate.

In addition, the effects that the Inventions 3 through 8 of this application can perform are within the scope that a person skilled in the art would expect from Cited Inventions 3 and known techniques, and they are not exceptional.

Therefore, Inventions 3 through 8 of this application could readily have been invented by a person skilled in the art based on Cited Inventions 3 and well-known techniques, and therefore a patented right cannot be granted pursuant to the provisions of Article 29 Paragraph 2 of the Patent Act.

6. Regarding Invention 9 of this application

The structure in which “Telecentric Relay Lens System 230 and Field Lens 240” of Cited Invention 1 form images generated by “Spacial Light Modulator) (SLM) 220 to intermediate images at the magnification of 3.8” corresponds to the structure in which “M1 is 2 through 7” of Invention 9 of this application.

Therefore, there is no difference between Invention 9 of this application and Cited Invention 1.

Therefore, since Invention 1 of this application is Cited Invention 1, it falls under Article 29 Paragraph 1 Item 3 of the Patent Act. Therefore, a patent right cannot be granted.

7. Invention 10 of this application

(1) Cited publications

Based on the above-mentioned matters of Cited Literature 1 (in particular, Figures 4 and 5), it is clear that “intermediate images” and “magnified images” are in an inverted relation.

Therefore, Cited Literature 1 describes the following invention (hereinafter referred to as “Cited Invention 4”).

“A projection system that comprises of Telecentric Relay Lens System 230 and Field Lens 240, wherein the image generated by Spatial Light Modulator 220 is formed as an intermediate image at the magnification of 3.8 times;

The intermediate images are [text missing] magnified images 5.[text missing] the aforementioned intermediate image is formed

Intermediate images are formed between Field Lens 240 and Field Lens 250.

The middle image and the magnification image are in a relationship of bankruptcy.

wherein Telecentric Relay Lens System 230 has an aperture diaphragm, and Projection Lens 310 does not have an aperture diaphragm."

(2) Comparison between and decision pertaining to Invention 10 of this application and Cited Invention 4

The structure of Cited Invention 4 that "intermediate images and enlarged images are in an inverted relation" corresponds to the structure of Invention 10 of this application that "the aforementioned first enlarged image and the second enlarged image are in an inverted relation".

Therefore, there is no difference between Invention 10 of this application and Cited Invention 4.

Therefore, since Invention 10 of this application is Cited Invention 4, it falls under Article 29 Paragraph 1 Item 3 of the Patent Act, and a patent right cannot be granted.

8. Regarding Invention 11 of this application

When comparing Cited Invention 11 of this application and Cited Invention 1, Cited Invention 1 differs from Cited Invention 11 of this application in that the correlation between the F value of "Telecentric Relay Lens System 230" and the F value of "Projection Lens 310" and "Field Lens 250" has not been identified.

However, the correlation between the two F-values can only be designed as appropriate.

In addition, the effects that Invention 11 of this application can perform is within the scope that a person skilled in the art would expect from Cited Invention 1, and they are not exceptional.

Therefore, Invention 11 of this application 11 could readily have been invented by a person skilled in the art based on Cited Invention 1, and therefore, a patent right cannot be granted pursuant to the provisions of Article 29 Paragraph 2 of the Patent Act.

Third requirement

1. This application does not satisfy the requirements set forth in Article 36 Paragraph 6 Item 2 of the Patent Act in terms of (1) and (2) below:

(1) Regarding the description of Claim 4

(a) Although there is a description of "the center of the screen", there is no description of "screen" in Claim 3 cited by Claim 4 or Claim 1 cited by Claim 3, and the configuration indicated by [the center of the screen] is unclear.

[b] Because "[a] optic axis of the second projection optical unit is offset from the center of the screen" is a description that defines a position relationship between [a] optic axis of the second projection optical unit and [a] screen center, and not a description that defines a position relationship between [a] optic axis of the second projection optical unit and [a] optic axis of the first projection optical unit, it is unclear how the description that "[a] optic axis of the second projection optical unit is eccentric with respect to the optical axis of the first projection optical unit so that the optical axis of the second projection optical unit is offset from the center of the screen." (Regardless of the

positional relationship between the "optical axis of the second projection unit" and the "optical axis of the first projection optical unit," the positional relationship between the "optical axis of the second projection optical unit" and the "center of the screen" can be changed by moving the "screen" relative to the "second projection optical unit.") Also, does the claimant assume that the optical axis of the first projection optical unit intersects the screen and the center of the screen?)

Thus, the inventions according to Claims 4 to 8 are not well defined.

(2) The description of Claim 7

In the description that [the] optical axis of the second projection optical unit is eccentric in a direction above the center of the screen, [the] reference to] the optical axis of the second projection optical unit is understood to be two, [the] optical axis of the first projection optical unit and [the] the center of the screen, and because the position relationship between [the] optical axis of the first projection optical unit and [the] the center of the screen is unknown, it is ultimately unclear which direction [the] the optical axis of the second projection optical unit is eccentric with respect to.

Therefore, the invention according to Claim 7 is not well defined.

2. The present application does not meet the requirements set forth in Article 36, Paragraph 4, Item 1 of the Patent Act in terms of (1) and (2) below.

(1)

(a) With regard to the description of “F2 (angle of divergence of rays”, which is the F value of the second projection optical unit, in paragraph [0014], it is understood that “F value” is the description of “angle of divergence of rays”, but the technical significance of the description of “F value” being “angle of divergence of rays” is unknown given that the focal distance of the lens is usually divided by the effective diameter.

(b) With regard to the description of "F2 of the second projection optical unit is advantageous for ultra-wide angles exceeding 90° because it takes up a large F2 of the second projection optical unit", the causal relationship between "F2 of the second projection optical unit” and "F of the angle of image is advantageous for ultra-wide angles exceeding 90°” is unknown, and the technical significance of "F2 of the second projection optical unit” is unknown.

(Furthermore, for (a) and (b) above, even if “F2” is the F value of “Group 2”, the technical significance remains unknown. (See below)

Therefore, the Detailed Description of the Invention of the present application does not describe the invention according to Claim 11 in accordance with the provisions of the Ministerial Ordinance on Economy, Trade and Industry.

(2) Paragraph [0028] states that “the F value of the light flux incident from the illumination optics to the first projection optics unit” and “the F value of the light flux exiting the first projection optics unit”, but the configuration indicated by each is unknown. (When [the first projection optical unit] is telecentric on both sides, does it mean the F value of the previous group and the F value of the latter group?)

Accordingly, the detailed description of the invention of this application is not well described enough to allow a person skilled in the art to practice the invention according to Claim 11.

*With regard to paragraph [0014], in the procedural amendment dated September 30, 2011, “first lens group” is corrected to “first projection optical unit”, and “second group” is corrected to “second projection optical unit”, but does the description in paragraph [0014] show the relationship between the F-values of the previous group ("first lens group") and the latter group ("second group", assuming that the “first projection optical unit” is both-sided telecentric in the first place? In both-sided telecentric optics, when the F value in the front group is set to F1, the F value in the rear group is set to F2, and the magnification is set to M1, it is obvious that $F2 = F1 \times M1$.

Chief Judge	Judge of the Patent Office	Masaya Ito	8808
	Judge of the Patent Office	Kiyoshi Kitagawa	7818
	Judge of the Patent Office	Yohisa Kawata	9410

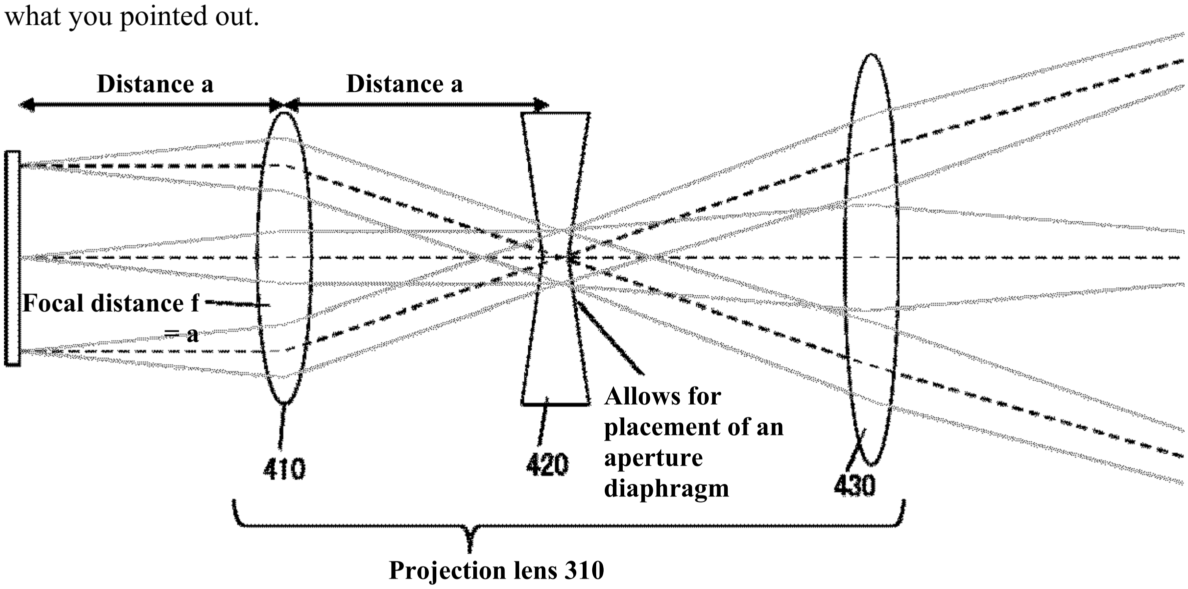
[Document name] Written Opinion
[Destination address] To : Masaya Ito, Judge of the Patent Office
[Indication of the case]
[Appeal No.] Objection 2012 - 2094
[Application number] Japanese Patent Application 2010-289130
[Patent applicant]
[Identification number] 000005108
[Name or title] Hitachi, Ltd.
[Agent]
[Identification number] 100100310
[Patent Attorney]
[Name or title] Manabu Inoue
[Phone number] 03-4235-2473
[Dispatch No.] 130956
[Details of opinions]

1. The Judge was found to have the following reasons for rejection: Therefore, the applicant amended the scope of the claim by procedural amendment submitted on the same date as this Opinion. Below, we will state a counterargument against the reason for rejection based on the content of the amendment.

2. Novelty and inventive step

The invention according to Claim 1 is referred to below as the invention of the present application. Examiner has pointed out that the invention of this application corresponds to Article 29 Paragraph 1 Item 3 of the Patent Act as it is an invention described in WO 02/21851 (hereinafter referred to as Cited Literature 1) (hereinafter referred to as Cited Invention 1). In particular, it has been pointed out that "if the structure of Telecentric Relay Lens System 230 has an aperture diaphragm and Projection Lens 310 does not have an aperture diaphragm" as seen in Cited Invention 1, it is clear that the "aperture diaphragm" of "Telecentric Relay Lens System 230" defines the F value of the entire "projection system" and that this structure corresponds to one in which "the aforementioned first projection optical unit includes an aperture diaphragm that defines the F value of the entire projection optical unit" of Invention 1 of this application.

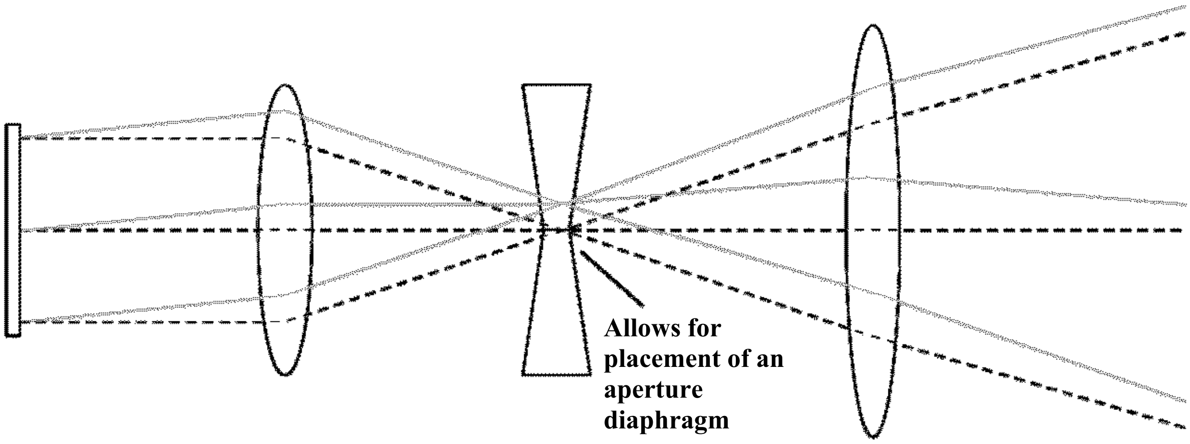
Here, a diagram of light rays that has added light rays to Figure 4 of Cited Literature 1 is shown below: It should be noted that, during the notification of the reasons for refusal, it was pointed out by Examiner that the ""Telecentric Relay Lens System 230" is telecentric on the image side, and "intermediate image" is clearly a structure in which it is telecentrically formed"". Therefore, this is indicated under conditions consistent with what you pointed out.



Paragraph 0036 of Special Schedule 2004-508779, which is the family literature of Cited Literature 1, states that "the light beam enters Projection Lens 310 via Lens 410 and focuses on the waist near Lens 420".

Here, Lenses 410 and 420 are positioned at the focal length (f = a) of Lens 410. Light rays parallel to the optical axis are focused at their focal point at Lens 410 (dotted lines in the figure). The light flux of the F value from the object point is a parallel light flux at lens 410 (solid line in the figure). That is, even if a telecentric light beam is incident on the projection lens, it is possible to place an aperture diaphragm.

In addition, the photographic diagram with the lower string light of the above drawing deleted is shown below.



In other words, even if telecentric light rays enter the projection lens at an angle, it is possible to place an aperture diaphragm.

Thus, in Cited Invention 1, it is not clear that an aperture diaphragm is provided in the first projection optical unit but that an aperture diaphragm is not provided in the second projection optical unit. Therefore, the configuration of Cited Invention 1 cannot be said to be a structure in which "Telecentric Relay Lens System 230" has an aperture diaphragm, and Projection Lens 310 does not have an aperture diaphragm", and naturally, it does not correspond to the structure of the inventions of this application. In addition, since the invention of this application has novelty and inventive step, other inventions (sub-paragraphs) that cite the inventions of this application also have novelty and inventive step.

Therefore, we believe that the reasons for refusal concerning novelty and inventive step have been resolved.

3. Described requirements

(1) Examiner has pointed out that Claim 4 does not have a description of "screen" prior to the description of "the center of the aforementioned screen". Furthermore, it has been pointed out that the meaning of the description of "the optical axis of the second projection optical unit is offset from the center of the screen" is not clear. The same point is made for Claim 7.

The former one pointed out by Examiner was an error. In addition, with regard to the latter pointed out by Examiner, the invention of this application uses "a screen" in the sense that the image of the image display element is formed on the image surface, and it is not used as "a screen" that can be placed independently of the image surface. However, because it is a misleading expression, we corrected the area to "move it from the center of the <u>image plane formed in the aforementioned image display element</u>".

(2) Pertaining to Claim 11, Examiner has pointed out that the technical meaning of the description of the F value in Paragraphs 0014 and 0028 of the Detailed Explanation of this application is not clear. In this application, Claim 11 was deleted for simplicity as the purpose of Invention 1 of this application is acquiring a patent right.

Therefore, we believe that the reason for refusal regarding the requirements for description has also been resolved.

4. As stated above, all reasons for the refusal are believed to have been resolved. We humbly ask you to re-examine and make a decision to grant the patent of this application.

End

[Document name] Procedure Revision
[Destination address] To: Director General of Japan Patent Office
[Indication of the case]
[Appeal No.] Objection 2012 - 2094
[Application number] Japanese Patent Application 2010-289130
[Person making revisions]
[Identification number] 000005108
[Name or title] Hitachi, Ltd.
[Agent]
[Identification number] 100100310
[Patent Attorney]
[Name or title] Manabu Inoue
[Phone number] 03-4235-2473
[Dispatch No.] 130956
[Procedure Revision 1]
[Name of document subject to revision] Scope of Patent Claims
[Name of items subject to revisions] Full text
[Revision Method] Modifications
[Details of revisions]
[Document Name] Scope of Patent Claims
[Claim 1]

A projection optical unit, wherein the projection optical unit that magnifies and projects an image displayed on an image display element is comprised of

a first projection optical unit having a positive refractive power for magnifying the image displayed on the image display element to form a first magnified image; and

a second projection optical unit having a positive refractive power for further enlarging the first magnified image to form a second magnified image;

Wherein the first magnified image is formed on the side of the image display element more than the second projection optical unit;

wherein magnification M1 of the first magnified image for the image displayed in the image display element is less than magnification M2 of the second magnified image for the first magnified image;

wherein the first projection optical unit comprises an aperture diaphragm defining an F value of the entire projection optical unit.

[Claim 2]

The projection optical unit of Claim 1, wherein the first projection optical unit is in a generally telecentric correlation with the image display element side of the first projection optical unit and the first magnified image side, wherein the first magnified image is telecentrically formed.

[Claim 3]

The projection optical unit of Claim 1, wherein the optical axis of the second projection optical unit is eccentric with respect to the optical axis of the first projection optical unit.

[Claim 4]

The projection optical unit of Claim 3, wherein the optical axis of the second projection optical unit is eccentric with respect to the optical axis of the first projection optical unit such that the optical axis of the second projection optical unit is offset from the center of the image plane formed in the image display element.

[Claim 5]

The projection optical unit of Claim 4, wherein the second projection optical unit is eccentric with respect to the first magnified image.

[Claim 6]

The projection optical unit of Claim 4, wherein the optical axis of the image display element and the optical axis of the first projection optical unit are not eccentric.

[Claim 7]

The projection optical unit of Claim 5, wherein the optical axis of the second projection optical unit is eccentric relative to the optical axis of the first projection optical unit in a direction above a center of an image plane formed in the image display element.

[Claim 8]

The projection optical unit of Claim 4, wherein the optical axis of the image display element and the optical axis of the first projection optical unit are not eccentric.

[Claim 9]

The projection optical unit of Claim 1, wherein the aforementioned M1 is from 2 through 7.

[Claim 10]

The projection optical unit of Claim 1, wherein the first magnified image and the second magnified image are in an inverted correlation.

Notice of Reasons for Refusal

Appeal Request Number (Number of Patent Application)	Objection 2012 - 2094 (Patent Application 2010-289130)
Drafting Date	February 12, 2013
Chief Examiner, Examiner, Japan Patent Office	Masaya Ito
Appellant	To Hitachi, Ltd.
Patent Attorney	Dear Mr. Manabu Inoue,

The application for this appeal should be refused as a result of the consultation for the following reasons: If you have any comments on this, please submit your Written Opinions within sixty (60) days from the date this notice is sent.

Reasons

1. Background of procedures

This application is a part of the patent application filed on November 28, 2003 (No. 2003-398395), as a new patent application on December 27, 2000, and the Notice of Reasons for Refusal was sent on July 27, 2011. Written Opinions were submitted on September 30, 2011, and Procedure Revision was submitted on the same day, and Decision of Refusal was made on November 02, 2001. In response to this, a request for a decision was made on February 03, 2012 against the decision to refuse the application, and at the same time, Procedure Revision was made.

Subsequently, the Notice of Reasons for Refusal was made at this hearing on December 07, 2012, Written Opinions were submitted on January 17, 2013, and Procedural Revision was submitted on the same day.

2. Invention of the present application

The inventions according to Claims 1 through 10 of the claims of this application (hereinafter referred to as “Inventions 1 through 10 of this application”) are specified by the matters described in Claims 1 through 10 of the claims revised by Procedure Revision dated January 17, 2013.

Invention 1 of this application

“A projection optical unit for magnifying and projecting an image displayed on an image display element:

a first projection optical unit having a positive refractive power for magnifying the image displayed on the image display element to form a first magnified image; and

a second projection optical unit having a positive refractive power for further enlarging the first magnified image to form a second magnified image;

Wherein the first magnified image is formed on the side of the image display element more than the second projection optical unit;

wherein magnification M1 of the first magnified image for the image displayed in the image display element is less than magnification M2 of the second magnified image for the first magnified image;

wherein the first projection optical unit comprises an aperture diaphragm that defines the F value for the entire projection optical unit”.

Invention 2 of this application
“The projection optical unit of Claim 1, wherein the first projection optical unit is in a nearly telecentric correlation with the image display element side of the first projection optical unit and the first magnified image side, and wherein the first magnified image is telecentrically formed.”
Invention 3 of this application
“The projection optical unit of Claim 1, wherein the optical axis of the second projection optical unit is eccentric with respect to the optical axis of the first projection optical unit.” (“the second projection optical unit” and “the first projection optical unit” of Claim 3 are determined to be typographical errors and they should read “the second projection optical unit” and “the first projection optical unit”, respectively.)
Invention 4 of this application
“The optical axis of the second projection optical unit is eccentric with respect to the optical axis of the first projection optical unit such that the optical axis of the second projection optical unit is offset from the center of the image plane formed in the image display element”. (“The second projection optical unit” and “the first projection optical unit” of Claim 4 are determined to be typographical errors and should read as “the second projection optical unit” and “the first projection optical unit”, respectively).
Invention 5 of this application
“The projection optical unit of Claim 4, wherein the second projection optical unit is eccentric with respect to the first enlarged image.” (“The second projection optical unit” of Claim 5 is determined to be a typographical error and should read “the second projection optical unit”.)
Invention 6 of this application
“The projection optical unit of Claim 4, wherein the optical axis of the image display element and the optical axis of the first projection optical unit are not eccentric.” (“The first projection optical unit” of Claim 6 is determined to be a typographical error and should read “the first projection optical unit”.)
Invention 7 of this application
The projection optical unit of Claim 5, wherein the optical axis of the second projection optical unit is eccentric with respect to the optical axis of the first projection optical unit in a direction above a center of an image plane formed in the image display element”. (“The second projection optical unit” and “the first projection optical unit” of Claim 7 are determined to be typographical errors and should read as “the second projection optical unit” and “the first projection optical unit”, respectively).
Invention 8 of this application
“The projection optical unit of Claim 4, wherein the optical axis of the image display element and the optical axis of the first projection optical unit are not eccentric.” (“The first projection optical unit” of Claim 8 is determined to be a typographical error and should read “the first projection optical unit”.)
Invention 9 of this application
“The projection optical unit of Claim 1, wherein M1 is 2 through 7.”
Invention 10 of this application
“The projection optical unit of Claim 1, wherein the first magnified image and the second magnified image are in an inverted correlation.”

3. Concerning Invention 1 of this application,

(1) Cited publications

WO 02/21851 (hereinafter referred to as “Cited Literature 1”), a publication distributed prior to the filing of the original application, describes the following: (As a tentative translation, the special bulletin 2004-508779 (hereinafter referred to as "Citated Literature 1'"), which is the family literature of Cited Literature 1, was adopted. Furthermore, the underlines were added by Examiner.)

This projection system is designed to be extremely compact to accommodate very limited space within Casing 140 and Dome 195. At the same time, it has the desired image magnification (x 20, for example) and resolution. The projection system is also designed to relay the above light beams from a stationary light source to a moving screen. One embodiment of such an optical projection system will be described in detail below.

When referring to Figures 2A and 2B, Front-end Optical Components 200 are mounted on Base 110 of Display 100 below Platform 160 (see Figure 1). Figures 2A and 2B also show a portion of Projection Engine 120 (see Figure 1). The projection engine includes a light source and a homogenizing and collimating optical element that delivers broadband light rays to Prism Assembler 210. Prism Assembler 210 separates light rays into three primary color components (i.e. red, green, and blue) and directs each component to Spatial Light Modulator (SLM) 220 (only one is shown). These SLMs are microelectromechanical system (MEMS) arrays of switchable micromirrors (e.g., Texas Instruments' DMDTM) capable of generating images of XGA resolution (1024 x 786) at the frequency of at least about 4 kHz. Each SLM spatially modulates each incident light beam to produce red, green, or blue component images. These images are recombined inside Prism Assembler 210 to form a single full color image (eight colors) and exit the projection engine on Surface 225.

Projection Engine 120 directs light rays toward Telecentric Relay Lens System 230. This relay lens system includes three doublet lenses 235, 236, and 237. Relay Lens System 230 images the SLM 220 in an intermediate image at a location about 600 millimeters away from the projection engine. The magnification of this intermediate image is 3.8 times, [text cut off] 8 times magnification and is formed between two Field Lenses 240 and 250, which are similarly doublet lenses. The functions of these field lenses are described below.

Relay Lens System 230 images the SLM in an intermediate image so that the optical distance and image magnification are within the constraints imposed by the display housing. The direct imaging of the SLM on the projection screen should require a much longer optical distance than the present embodiment. This is due to a large amount of glass being used in Prism Assembler 210 between SLM 220 and the optical projection system. When imaged from the intermediate image to the projection screen, the projection optical element can be positioned close to the intermediate image, and the optical distance can be significantly shortened. Front-end Optical Element 200 includes Tri-fold Mirrors 260, 270, and 280. These mirrors fold the projected optical path to accommodate the optical path within the stereoscopic interior of the display device casing. Mirrors 260, 270, and 280 also direct light rays toward Mirror 290, which is located on Axis 170 and directs light rays from the plane of Base 110 (see Figure 1) to the exterior and along the axis of Rotation 170 to the projection lens. In the projection lens, Rotation Axis 170 is consistent with the optical axis of the projection system. Foldable Mirrors 260 and 270 can be manually adjusted during operation to allow the user to accurately align the image to the center of the projection screen.

Referring to Figure 3, Projection Lens 310 focuses light rays through Annular Shaft 320 of Frameless DC Motor 330. Projection Lens 310 and Mirrors 340, 350, and 360 together configure the backend of the optical projection system. Mirrors 340, 350, and 360 are mounted on Platform 160 (see Figure 1) and flex the optical path of the light beam to accommodate the optical path inside Dome 195 (see Figure 1). Projection Lens 310 directs the light rays toward Mirror 340; Mirror 350 directs the light rays toward Mirror 360; Mirror 350 directs the light rays toward Mirror 360; and Mirror 360 directs the light rays toward Projection Screen 190 to form an enlarged image of SLM in Region 370. Image Region 370 spans about 10 inches in diameter and corresponds to 20 times the image in SLM. The SLM image is trimmed to the resolution of 768 x 768 pixels. As described above, in operation, Motor 330 rotates the backend projection optical element (in other words, Projection Lens 310 and Mirrors 340, 350, and 360) around Axis 170.

Referring to Figure 4, Projection Lens 310 includes a triplet lens assembly device consisting of Lenses 410, 420, and 430. Lenses 410, 420, and 430 are coaxially aligned along Lens Axis 440. Lens Axis 440 is inclined about 10 degrees or less (e.g., approximately 4. 94°) at Angle 450, and this optical axis coincides with Rotation Axis 170 at this point. The light beam enters Projection Lens 310 via Lens 410 and is focused at the waist near Lens 420. On the first surface of Lens 410, Lens Axis 440 is approximately 5. 9 mm displaced from the optical axis. In order for the light beam to pass through the opening of Motor 330 (see Figure 3), it is necessary to focus the light beam on the waist. The light beam exits Projection Lens 310 via Lens 430. The purpose of designing the projection lens in this way becomes apparent when the optical passages of the projection system are deployed.

Referring to Figure 5, which shows the deployed optical passage, Projection Screen 190 is angled at 45 degrees relative to Optical Axis 510 of the projection system. This is why Projection Lens 310 is inclined relative to Optical Axis 510. When the projection lens is inclined, the plane of the image is inclined by a predictable amount (given by the so-called shyimflug (original word: Scheimflug) condition). This reduces distortion caused by projection of the image to a plane not orthogonal to the optical axis. Inclination Angle 450 is determined by the angle between the plane of the projection screen and the optical axis, and these two angles are not limited to the angles described above.

Projection Lens 310 provides to the image an optical aberration, such as a negative image plane curvature, a negative axial color, and a lateral color (originally referred to as lateral color). Prism Assembly Device 210 (see Figure 2) also provides an aberration in the image. These aberrations are partially compensated by Relay Lens 230 and Field Lenses 240 and 250. Three Doublet Lenses 235, 236, and 237 are used for Relay Lens 230 to minimize the magnification of the relay lens to reduce aberration. Doublets are used to minimize the dispersion effect of each component. At least one doublet is a doublet with a high refractive index (original word: index), which increases the axial color and image plane curvature to compensate for the aberration caused by Projection Lens 310. Field Lenses 240 and 250 are also doublet lenses, which maintain telecentricity (original word: telecentricity) at the location of the intermediate image at the location of the intermediate image formed on Plane 520. First Doublet Lens 240 is located about 30 mm in front of Intermediate Image Plane 520 and corrects the incident light to be near-telecentric (originally near-telecentric). Additionally, Lens 240 also reduces axial color and image plane curvature. Second Doublet Lens 250 is located about 30 mm past Intermediate Image Plane 520, resulting in a positive image plane curvature and axial color and overcompensating for correction of Lens 240. The image curvature and net contribution to axial and transverse colors provided by Lenses 235, 236, 237, 240, and 250 compensate for the opposite effect provided by Projection Lens 310. At Projection Screen 190, the blue and green images overlap, while the red images are displaced axially. As System F number is set to be low on the projection screen, the depth of focus is large. Due to the compensating contribution of the projection lens and other lenses to the image plane curvature, this aberration is designed to be an inclined plane rather than a curved surface. Also, the astigmatism of the image is low, and the horizontal color is minimal. Image distortion is normal trapezoidal distortion, and the residual thread-wound distortion is less than 2 percent. The image quality on the projection screen can sufficiently resolve 40 pixels per millimeter resolution of the SLM. This resolution corresponds to about 2 pixels per millimeter in the projection screen.

The software pre-distorts the image to compensate for the trapezoidal effect in the image plane. The software also compensates for the rotational display of the axis of motion of the image by rotating the image data in the opposite direction. The reason for the rotational representation of the axis of motion of the image (i.e., the rotation of the image in the plane of the projection screen) is that the front-end optical element displays the fixed image on the projection screen that rotates.” (Cited Literature 1, Page 5 Line 29 to Page 8 Line 27 (Cited Literature 1 Paragraphs[0030]-[0039]))

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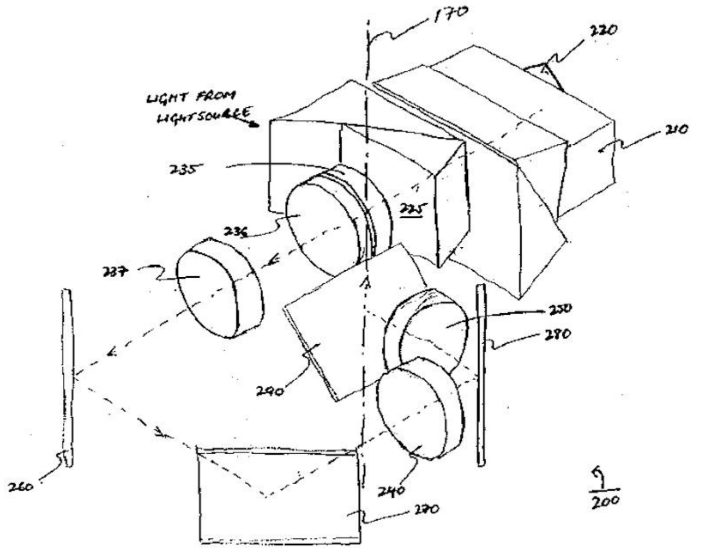

FIG 2A

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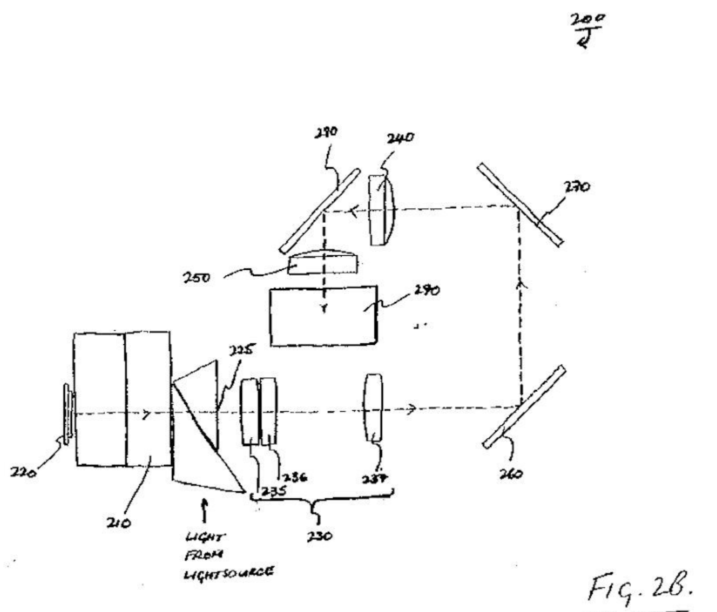

Fig. 2B.

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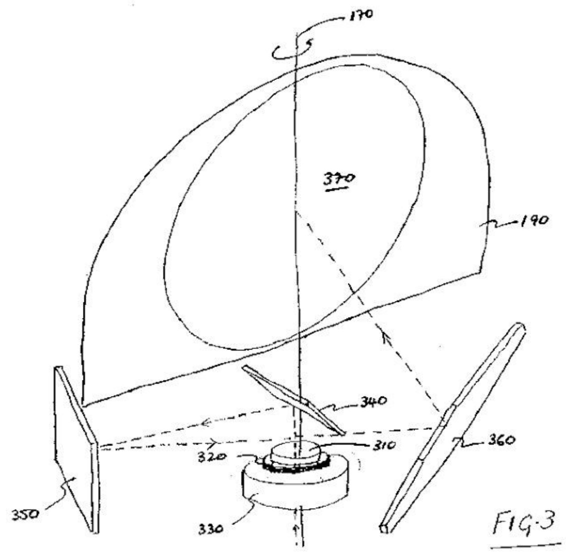
170
370
190
340
310
360
320
350
330

FIG. 3

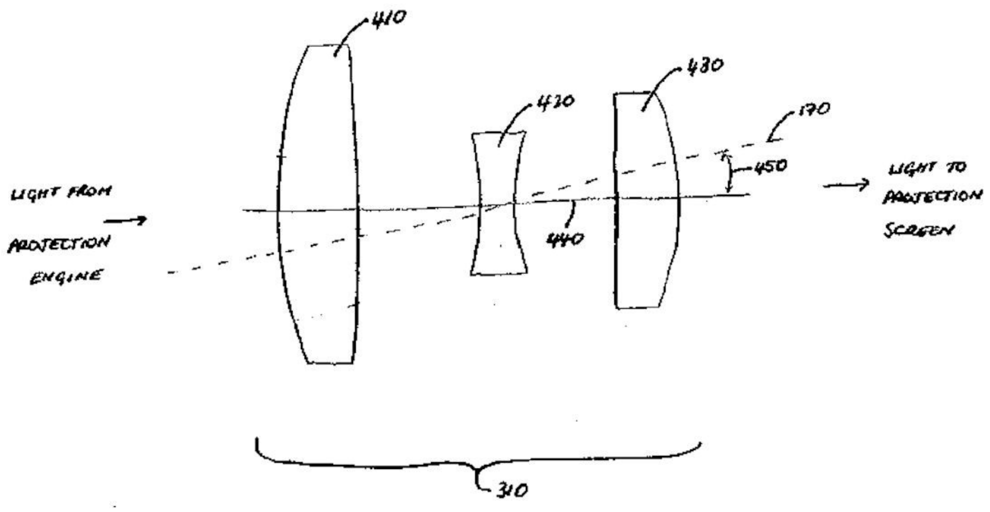
410
480
420
170
450
LIGHT FROM
PROJECTION
ENGINE
LIGHT TO
PROJECTION
SCREEN
440
310

FIG. 4

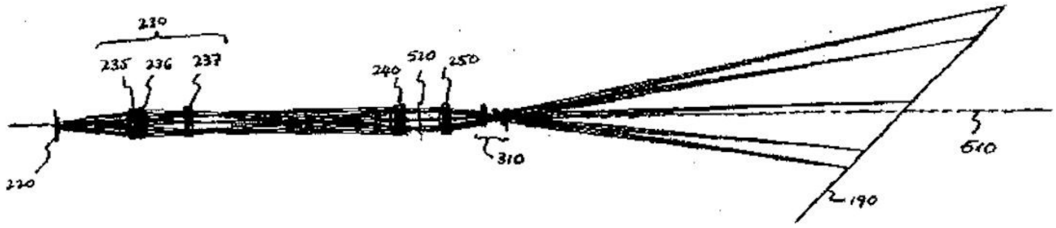

FIG. 5

From the description reading “The magnification of this intermediate image is 3. 8 times”, and from the description that reads, "SLM magnification is formed in Region 370. Image Region 370 is described as ... approximately equaling 20 times the image in the SLM”, it is clear that “magnified image” is 5. 26 times (= 20 times/3. 8 times) larger than the “intermediate image”.

In addition, since it is common technical knowledge that the telecentric optical system has an aperture diaphragm, it is clear that the "Telecentric Relay Lens System 230" described above has an aperture diaphragm.

Therefore, based on the matters described in Cited Literature 1 above and common technical knowledge, Cited Literature 1 refers to the following invention (hereinafter referred to as "Cited Invention 1").

“A projection system that comprises of Telecentric Relay Lens System 230 and Field Lens 240, wherein the image generated by Spatial Light Modulator 220 is formed as an intermediate image at the magnification of 3.8 times;

and Projection Lens 310 and Field Lens 250, wherein [text missing] imaged at [text missing] 26 times magnification, having Projection Lens 310 and Field Lens 250 including a triplet lens assembly device consisting of Lenses 410, 420, and 430;

between Field Lens 240 and Field Lens 250; and

Telecentric Relay Lens System 230 is a projection system with an aperture diaphragm”.

(2) Comparison

Invention 1 of this application and Cited Invention 1 are compared.

(a) As the “Projection System” having “Telecentric Relay Lens System 230 and Field Lens 240” and “Projection Lens 310 and Field Lens 250” of Cited Invention 1 projects “images generated by Spatial Light Modulator (SLM) 220” that are magnified to “Magnified Images” at the magnification of 20 times (= 3.8 times × 5. 26 times), it corresponds to the "projection optical unit that magnifies and projects the image displayed on the image display element" of Invention 1 of this application.

(b) As it is clear that “Telecentric Relay Lens System 230 and Field Lens 240” of Cited Invention 1 “form” "images generated by Spatial Light Modulator (SLM) 220 as intermediate images" and that they have a positive refractive power, “Telecentric Relay Lens System 230 and Field Lens 240 that form the images generated by Spatial Light Modulator (SLM) 220 at the magnification of 3.8 times" of Cited Invention 1 correspond to the "first projection optical unit with positive refractive power to magnify images displayed on the aforementioned image display element to generate the first magnified image" of Invention 1 of this application. In the same manner, "Projection Lens 310 and Projection Lens 310 and Field Lens 250, which image at the magnification of 26 times, and include a triplet lens assembly device consisting of Lenses 410, 420, and 430, correspond to the "second projection optical unit with a positive refractive power to further magnify the first magnified image to form a second magnified image" of Invention 1 of this application.

(c) The structure in which "the aforementioned intermediate images are formed between Field Lens 240 and Field Lens 250" of Cited Invention 1 corresponds to the structure in which "the first magnified images of Invention 1 of this application are formed on the image display element side more than they are on the second projection optical unit side".

(d) As the structure wherein "Telecentric Relay Lens System 230 and Field Lens 240" of Cited Invention 1 "forms images at the magnification of 3.8 times" and "Projection Lens 310 and Field Lens 250" "form images at the magnification of 5.26 times" can be expressed as "3.8 times" < "5.26 times" the magnification M1 of the first magnified images for the images displayed on the aforementioned image display element of Invention 1 of this application correspond to a structure in which "M1, the magnification rate of magnifying the images displayed on the aforementioned image display element to the aforementioned first magnified images is smaller than the magnification rate of M2 for the second magnified images against the aforementioned first magnified images".

(e) The structure in which "Telecentric Relay Lens System 230 has an aperture diaphragm" of Cited Invention 1 and the fact that "the first projection optical unit" of Invention 1 of this application "includes an aperture diaphragm that defines the F value of the entire projection optical unit" are consistent with one another in that "the first projection optical unit includes an aperture diaphragm".

Thus, both

"A projection optical unit for magnifying and projecting an image displayed on an image display element:

a first projection optical unit having a positive refractive power for magnifying the image displayed on the image display element to form a first magnified image; and

a second projection optical unit having a positive refractive power for further enlarging the first magnified image to form a second magnified image;

Wherein the first magnified image is formed on the side of the image display element more than the second projection optical unit;

wherein magnification M1 of the first magnified image for the image displayed in the image display element is less than magnification M2 of the second magnified image for the first magnified image;

[text missing] is consistent with the description [text missing] that the aforementioned first projection optical unit is a projection optical unit that includes an aperture diaphragm" but differs in (a) below.

(a) With respect to "an aperture diaphragm" included in "the first projection optical unit", the F value of the entire projection optical unit is defined in Invention 1 of this application, while the F value of the entire projection optical unit is not specified in Cited Invention 1.

(3) Decision

The aforementioned difference (a) is examined:

When referring to the above description in Cited Literature 1 that reads, “Rays enter Projection Lens 310 via Lens 410 and are focused on the waist near Lens 420” and the description in Figure 4, it is clear to those skilled in the art that it is possible to provide an aperture diaphragm near “Lens 420” of Cited Invention 1.

In addition, in “Lens 410” of Cited Invention 1, as light rays narrowed by the aperture diaphragm in “Telecentric Relay Lens System 230” enter into the telecentric system, it is clear that light rays near “Lens 420” are already narrowed to a certain extent.

In such “Projection Lens 310”, if a certain amount of light rays already narrowed near “Lens 420” are further narrowed by an aperture diaphragm, the image projected on “Projection Screen 190” would become darker, but there is no effect such as rounding off the problem and creating an aperture diaphragm. Therefore, it can be said that it is a natural design for a person skilled in the art to avoid such aperture diaphragm.

In the “projection system” of Cited Invention 1, which does not configure an aperture diaphragm in “Projection Lens 310”, it is obvious that “Aperture Diaphragm” of “Telecentric Relay Lens System 230” provides the overall F value of the “Projection System”.

Given this, in Cited Invention 1, a person skilled in the art would readily have obtained the invention specifics of the present invention of this application pertaining to the above difference (a) by not having an aperture diaphragm configured on “Projection Lens 310”.

In addition, the effects that can be performed by Invention 1 of this application are within the scope that a person skilled in the art would expect from Cited Invention 1, and they are not exceptional.

Therefore, Invention 1 of this application could readily have been invented by a person skilled in the art based on Cited Invention 1. Therefore, a patent right cannot be granted pursuant to the provisions of Article 29 Paragraph 2 of the Patent Act.

4. Invention 2 of this application

(1) Cited publications

(a) “Telecentric Relay Lens System 230” and “Field Lenses 240 and 250” of the above described matter of Cited Literature 1 are also doublet lenses and maintain telecentricity (original wording: telecentricity) at the position of the intermediate image formed on Plane 520”. From the description of “Telecentric Relay Lens System 230” and description in “Figure 5”, it is clear that the “Telecentric Relay Lens System 230” is telecentric on the imaging side and that “intermediate images” are telecentrically formed.

Therefore, Cited Literature 1 describes the following invention (hereinafter referred to as "Cited Invention 2").

“A projection system that comprises of Telecentric Relay Lens System 230 and Field Lens 240, wherein the image generated by Spatial Light Modulator 220 is formed as an intermediate image Telecentric Relay Lens System 230 and Field Lens 240 that are telecentric on the imaging side and are formed at the magnification of [text missing] 8; and magnification;

and Projection Lens 310 and Field Lens 250, wherein [text missing] imaged at [text missing] 26 times magnification, having Projection Lens 310 and Field Lens 250 including a triplet lens assembly device consisting of Lenses 410, 420, and 430;

the intermediate images are telecentrically imaged and formed between Field Lens 240 and Field Lens 250;

Telecentric Relay Lens System 230 is a projection system with an aperture diaphragm”.

(b) Japanese Unexamined Patent Application Publication No. 2001-208968, which is a publication distributed prior to filing the original application (hereinafter referred to as “Cited Literature 2”), describe the following: (The underlines were added by Examiner.)

“[0028] The light reflected by DMD 33 (cross-sectional image) is parallelized by Intermediate Optical System 511 and passes through Image Rotation Compensation Mechanism 34 to compensate for rotation of the cross-sectional image. Then, the light flux that is rotationally compensated in Image Rotation Compensation Mechanism 34 is eventually projected onto the major surface (projection surface) of Screen 38 via Projection Mirror 36, Projection Lens 513, and Projection Mirror 37. Accordingly, processing and Projection Optics 50 and DMD 33 sequentially generate plural cross-sectional images based on the two-dimensional image data and form a projection image-generation means for sequentially projecting plural cross-sectional images onto the screen in synchronization with the rotational scan of Screen 38.

“[0049] The light (cross-sectional image) of each of the R component, G component, and B component generated in each region of DMD 33 is made into parallel light by Bilateral Telecentric Optical System 511a through TIR Prism 44. The light (cross-sectional image) of each component of R, G, and B that has become parallel light forms three different optical paths. For example, as shown in Figure 7, three parallel lights are formed: the light of the R component passes through the upper side of the light of the G component, and the light of the B component passes through the lower side of the light of the G component”.

“[0057] < D. As explained above, bilateral telecentric optics: In this embodiment, Bilateral Telecentric Optical System 511a is provided as an imaging optical system of the equal magnification in Intermediate Optical System 511, but this optical system is telecentric for the following reasons.

[0058] On the Display Element (DMD33) side (reduced side in the magnified optical system), the light reflected by DMD 33 needs to be telecentric (telecentric on the object side) by the optical system (hereinafter referred to as “processing optical system”) so that it does not get declined by the optical system.

[0059] In addition, the side forming the intermediate images (the enlargement side in the enlargement optical system) is preferably telecentric (telecentric on the imaging side) in order to relay to Projection Optical System 52 without losing the amount of light and to eliminate the need for condenser lenses when it enters Projection Optical System 52”.

“[0061] Due to such circumstances, the optical system is configured to be telecentric on both sides. In this embodiment, Optical Path Length Regulators 511b and 511c, Dichroic Mirrors 511d and 511e, Mirrors 511f and 511g, and Image Rotation Compensation Mechanism 34 fall under the processing optical system.

“[0067] Moreover, Bilateral Telecentric Optical System 511a having such performance, in particular one of the Bilateral Telecentric Optical Systems 511a1 through 511a6 of each of the embodiments described below, is arranged in a way the focal point of the display element side thereof is located on the surface of DMD 33, and the focal point of the side forming the intermediate image is located at or near the entrance to each of the processing optics described above”.

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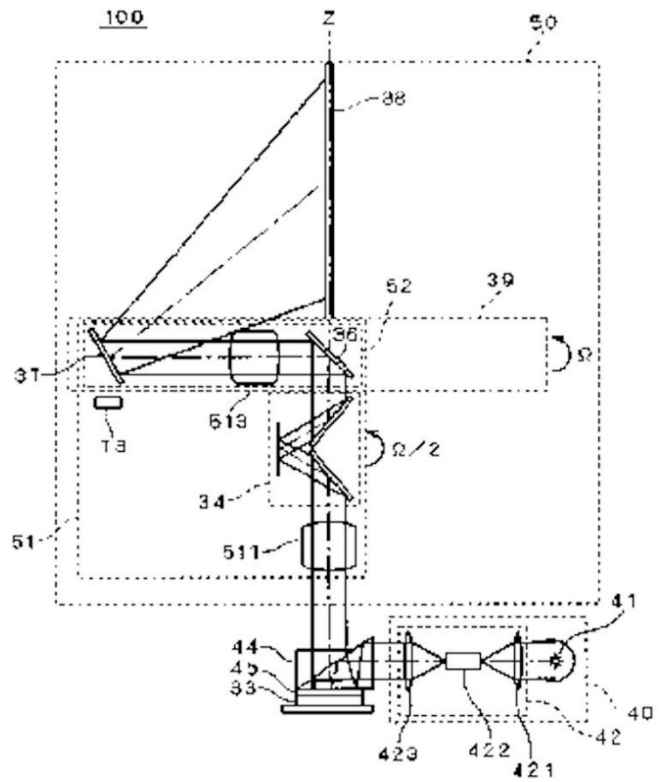
[Figure 2]



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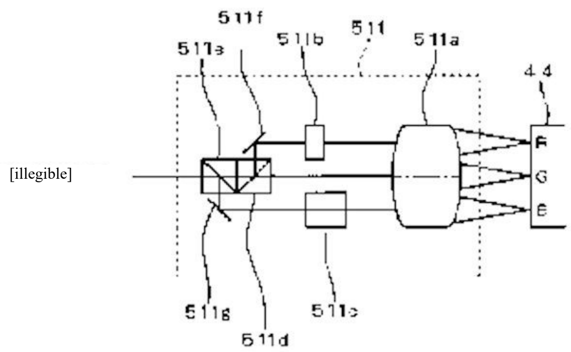
[Figure 7]



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(2) Comparison

The structure in which "Intermediate images are telecentrically formed between Field Lens 240 and Field Lens 250" of Cited Invention 2 corresponds to the structure in which "The first magnified image is telecentrically formed" of Invention 2 of this application.

Thus, Invention 2 of this application and Cited Invention 2 are different in (b) below, in addition to difference (a) described in "3." "(2)" above.

(b) In Invention 2 of this application, "The first projection optical unit has a nearly telecentric correlation on the image display element side of the first projection optical unit and the first magnified image side" while in Cited Invention 2, "Telecentric Relay Lens System 230 and Field Lens 240" are "telecentric on the imaging side".

(3) Decision

The aforementioned difference (a) is as examined in "3." "(3)" above.

The aforementioned difference (b) is examined.

In Cited Invention 2, "Telecentric Relay Lens System 230 and Field Lens 240" are "telecentric on the imaging side", but it is not telecentric on the object side. In addition, it is clear that the structure in which "the first projection optical unit" of Invention 2 of this application is substantially telecentric in a correlation to the image display element side and the first magnified image side of the first projection optical unit. In other words, "the first projection optical unit" is substantially telecentric on both sides.

Cited Literature 2 discloses a technical matter, in which the "intermediate images" by "Intermediate Optical System 511a" are projected on to "Screen 38" by the "light reflected by DMD 33 (cross-sectional image)" using "Projection Lens 513", and "Intermediate Optical System 511a" is used as a bilateral telecentric optical system. In addition, Cited Literature 2 describes the technical matter that it is preferable to be telecentric on the object side since "the processing optical system" does not cause the light from "DMD 33" to be diffracted. In addition, Cited Literature 1 describes the technical matter of placing the optical system "Spatial Light Modulator (SLM) 220" on the side of "Telecentric Relay Lens System 230 and Field Lens 240", so that the light from Spatial Light Modulator (SLM) 220 is not diffracted.

In addition, the effects that can be achieved by Invention 2 of this application are within the scope that a person skilled in the art would expect from the technical matters described in Cited Invention 2 and Cited Literature 1 and Cited Literature 2, and they are not exceptional.

Therefore, Invention 2 of this application could readily have been invented by a person skilled in the art based on the technical matters described in Cited Invention 2, Cited Literature 1, and Cited Literature 2. Therefore, a patent right cannot be granted pursuant to the provisions of Article 29 Paragraph 2 of the Patent Act.

5. Inventions 3 through 8 of this application

(1) Cited publications

From the afore-mentioned matters of Reference 1, it is obvious that the optical axis of "Telecentric Relay Lens System 230 and Field Lens 240" matches the optical axis of the projection system. Moreover, since Projection Lens 310 is a structure that is inclined relative to the optical axis of the projection system, it is clear that the optical axis of "Projection System 310" is a structure that is inclined relative to the optical axis of "Telecentric Relay Lens System 230 and Field Lens 240".

Therefore, Cited Literature 1 describes the following invention (hereinafter referred to as "Cited Invention 3"):

"A projection system that comprises of Telecentric Relay Lens System 230 and Field Lens 240, wherein the image generated by Spatial Light Modulator 220 is formed as an intermediate image at the magnification of 3.8 times;

The intermediate images are [text missing] magnified images 5.[text missing] [text missing] imaged at [text missing] 26 times magnification, having Projection Lens 310 and Field Lens 250 including a triplet lens assembly device consisting of Lenses 410, 420, and 430;

Intermediate images are formed between Field Lens 240 and Field Lens 250.

The optical axis of Projection Lens 310 is inclined relative to the optical axis of Telecentric Relay Lens System 230 and Field Lens 240.

Telecentric Relay Lens System 230 is a projection system with an aperture diaphragm".

(2) Comparison

Inventions 3 through 8 of this application and Cited Invention 3 differ in (c) below, in addition to the difference (a) described in "3." "(2)" above:

(c) In inventions 3 through 8 of this application, the optical axis of the first projection optical unit and the optical axis of the second projection optical unit are eccentric, while in Cited Invention 3, "the optical axis of Projection Lens 310 is inclined toward the optical axis of Telecentric Relay Lens system 230 and Field Lens 240".

(3) Decision

The aforementioned difference (a) is as examined in "3." "(3)" above.

The aforementioned difference (c) is examined:

In the projection device in general, when the optical axis of the projection system is not perpendicular to the screen, the projected images are distorted into a trapezoidal shape, and the distortion is corrected by a configuration that eccentricizes a part of the projection system. The optical axis of Projection Lens 310 of Cited Invention 3 is well known as shown in the Japanese Unexamined Patent Application Publication No. H2-287586 (see "Abstract of the Invention", etc.), Japanese Unexamined Patent Application Publication No. H10-133101 (see "Abstract", Paragraphs [0005] - [0006], etc.), Japanese Unexamined Patent Application Publication No. H11-231213 (see "Abstract", etc.), and Japanese Unexamined Patent Application Publication No. H2000-155288 (see [Overview] Paragraph [0023]).

In addition, in such a case, which one among "Telecentric Relay Lens System 230, Field Lens 240", and "Projection Lens 310" is decenterized to what extent is to be designed by a person skilled in the art as appropriate.

In addition, the effects that the Inventions 3 through 8 of this application can perform are within the scope that a person skilled in the art would expect from Cited Inventions 3 and known techniques, and they are not exceptional.

Therefore, Inventions 3 through 8 of this application could readily have been invented by a person skilled in the art based on Cited Inventions 3 and well-known techniques, and therefore a patented right cannot be granted pursuant to the provisions of Article 29 Paragraph 2 of the Patent Act.

6. Regarding Invention 9 of this application

The structure in which "Telecentric Relay Lens System 230 and Field Lens 240" of Cited Invention 1 form images generated by "Spacial Light Modulator) (SLM) 220 to intermediate images at the magnification of 3.8" corresponds to the structure in which "M1 is 2 through 7" of Invention 9 of this application.

Thus, invention 9 of this application and Cited Invention 1 differ in (a) described in “3.” “(2)” above.

As for this difference (a), it is as examined in “3.” “(3)”.

In addition, the effects that Invention 9 of this application can perform are within the scope that a person skilled in the art would expect from Cited Invention 1, and they are not exceptional.

Therefore, as Invention 9 of this application could readily have been invented by a person skilled in the art based on Cited Invention 1, a patent right cannot be granted pursuant to the provisions of Article 29 Paragraph 2 of the Patent Act.

7. Invention 10 of this application

(1) Cited publications

Based on the above-mentioned matters of Cited Literature 1 (in particular, Figures 4 and 5), it is clear that “intermediate images” and “magnified images” are in an inverted relation.

Therefore, Cited Literature 1 describes the following invention (hereinafter referred to as “Cited Invention 4”).

“A projection system that comprises of Telecentric Relay Lens System 230 and Field Lens 240, wherein the image generated by Spatial Light Modulator 220 is formed as an intermediate image at the magnification of 3.8 times;

The intermediate images are [text missing] magnified images 5.[text missing] [text missing] imaged at [text missing] 26 times magnification, having Projection Lens 310 and Field Lens 250 including a triplet lens assembly device consisting of Lenses 410, 420, and 430;

Intermediate images are formed between Field Lens 240 and Field Lens 250.

The middle image and the magnification image are in a relationship of bankruptcy.

Telecentric Relay Lens System 230 is a projection system with an aperture diaphragm”.

(2) Comparison

The structure of Cited Invention 4 that “intermediate images and enlarged images are in an inverted relation” corresponds to the structure of Invention 10 of this application that “the aforementioned first enlarged image and the second enlarged image are in an inverted relation”. Invention 10 of this application and Cited Invention 4 of this application differ in the points listed in (a) described in “3.” “(2)” above.

(3) Decision

The aforementioned difference (a) is as examined in “3.” “(3)” above.

In addition, the effects that Invention 10 of this application can perform are within the scope that a person skilled in the art would expect from Cited Invention 4, and they are not exceptional.

Therefore, as Invention 10 of this application could readily have been invented by a person skilled in the art based on Cited Invention 4, a patent right cannot be granted pursuant to the provisions of Article 29 Paragraph 2 of the Patent Act.

Chief Judge	Judge of the Patent Office	Masaya Ito	8808
	Judge of the Patent Office	Kiyoshi Kitagawa	7818
	Judge of the Patent Office	Tomohisa Tsuchiya	8826

Decision

Objection 2012 - 2094

(omitted)
Appellant Hitachi, Ltd.

(omitted)
Patent Attorney Manabu Inoue

Regarding the appeal case concerning the objections to the refusal of "Projection Optical Unit" Patent Application 2010-289130 [published on April 21, 2011; Unexamined Patent Application 2011-81415], the decision is made as follows:

Conclusion

The appeal of this case cannot be brought forth.

Reasons

It is acknowledged that this application was filed on December 27, 2010 (retroactive application filed on November 28, 2003) and that the inventions according to Claims 1 through 10 of this application are as specified by the matters described in Claims 1 through 10 of the claims revised by procedure revisions dated January 17, 2013.

In response to this, we sent Notice of Reasons for Refusal on February 12, 2013 and gave Appellant the opportunity to submit Written Opinions with a specified period, but there was no response from Appellant.

Moreover, since the above reasons for refusal are found to be reasonable, this application should be refused by the said reasons for refusal.

Therefore, the decision has been made as per the conclusion.

June 05, 201 3

Chief Judge Judge of the Patent Office Masaya Ito
Judge of the Patent Office Tomohisa Tsuchiya
Judge of the Patent Office Kiyoshi Kitagawa

(Instructions based on Article 46 of the Administrative Cases Law)

This decision may be appealed within thirty (30) days from the date of service of the copy of this decision (if there is an additional period, the number of days shall be added). You can file the Director General of Japan Patent Office as a defendant within.

[Decision Classification] 121-WZF (G02B)
P18

Chief Judge	Judge of the Patent Office	Masaya Ito	8808
	Judge of the Patent Office	Kiyoshi Kitagawa	7818
	Judge of the Patent Office	Tomohisa Tsuchiya	8826