UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CORETRONIC CORPORATION and
OPTOMA CORPORATION,

Petitioners,

- vs. -

MAXELL, LTD.,

Patent Owner

IPR2025-00477

DECLARATION OF DR. JOSE SASIAN
IN SUPPORT OF PETITION FOR INTER PARTES REVIEW
OF U.S. PATENT NO. 7,850,313

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I, Jose Sasian, declare as follows:

I. Introduction

1. I am an independent consultant. I am over eighteen years of age, and I would otherwise be competent to testify as to the matters set forth herein if I am called upon to do so.

2. I have prepared this Declaration for consideration by the Patent Trial and Appeal Board in the *Inter Partes* Review of U.S. Patent No. 7,850,313 ("the '313 Patent").

3. I provide this Declaration at the request of Coretronic Corporation and Optoma Corporation (collectively, "Petitioners") in connection with the above-captioned *Inter Partes* Review. I have been informed and understand that Petitioners contend that claims 1–3 of the '313 Patent are unpatentable.

4. I have been asked to provide my opinions regarding whether claims 1-3 of the '313 Patent are unpatentable because they would have been obvious to a person of ordinary skill in the art ("POSITA") at the time of the alleged invention, in light of the prior art. After careful analysis it is my opinion that the subject matter of claims 1-3 would have been obvious to a POSITA.

5. I am being compensated at my standard hourly rate of $650 per hour. My compensation is not dependent on the outcome of, or any issue in relation to, the above-captioned *Inter Partes* Review. I have no interest in any of the parties.

6. In forming my opinions, I relied on my knowledge and experience in the field and on documents and information referenced in this Declaration.

7. My complete qualifications and professional experience are described in my *Curriculum Vitae*, a copy of which can be found in EX1003. The following is a brief summary of my relevant qualifications and professional experience.

8. I am not an attorney. As shown in my *Curriculum Vitae*, I have extensive academic and industry experience with optical engineering. Specifically, I have over thirty years of academic and industry experience in the field of optical sciences and optical engineering in general, including optical instrumentation, optical design, and optical fabrication and testing.

9. I am currently a full-time, tenured Professor of Optical Sciences at the Wyant College of Optical Sciences at the University of Arizona in Tucson, Arizona, a position I have held since 2002. As a professor, I teach and perform research in the field of optical design. For example, I teach my students how to design lenses and mirrors and how to think about light so that they can design useful optical systems. As part of my academic and research responsibilities I am frequently involved with the design, fabrication, and testing of optical devices.

10. From 1995 to 2001, prior to receiving tenure, I was an Associate Professor of Optical Sciences at the University of Arizona. Prior to joining the

University of Arizona faculty, I was a member of the technical staff of AT&T Bell Laboratories from 1990 to 1995. From 1984 to 1987, I was a Research Assistant, and from 1988 to 1990, I was a Research Associate, in the Optical Sciences Center at the University of Arizona. From 1976 to 1984, I was an optician at the Institute of Astronomy at the University of Mexico.

11. I received a Bachelor of Science degree in Physics from the University of Mexico in 1982, a Master of Science degree in Optical Sciences from the University of Arizona in 1987, and a Ph.D. in Optical Sciences from the University of Arizona in 1988. My research areas include optical design, fabrication, and testing of optical instruments, astronomical optics, diffractive optics, opto-mechanical design, light in gemstones, lithography optics, and light propagation.

12. At the University of Arizona, I have taught the courses Lens Design OPTI 517 (1997-present), Introduction to Aberrations OPTI 518 (2005-present), Advanced Lens Design OPTI 696A (2008, 2012, 2017, 2021), Illumination Optics Seminar (1997-2000), Introduction to Opto-mechanics OPTI 690 (1998, 2001, 2003, 2004, 2005), Optical Shop Practices OPTI 597A (1996-present), and Optical Specification, Fabrication and Testing OPTI 415 (2023-present). In these classes, among other things, I teach students how to design optical systems for imaging and for uniform illumination, how to mount optical elements properly so that their physical integrity is preserved, and properly align and test optical systems.

13. I have directed several student reports, theses, and dissertations in the area of optical design. I have lectured regarding my work, and have published, along with students and colleagues, over one hundred scientific papers in the area of optics. These include technical papers, student reports and theses done under my direction, related to photographic optics and illumination. For example:

a. Efficient EUV collector designs, USP 7,405,871, 2009

b. Sukmock Lee, Byongoh Kim, Jiyeon Lee, and Jose Sasian, "Accurate determination of distortion for smart phone cameras," Applied Optics, Vol. 53, Issue 29, pp. H1-H6 (2014).

c. D. Reshidko and J. Sasian, "Role of aberrations in the relative illumination of a lens system," - Opt. Eng. 55(11), 115105 (Nov 29, 2016). doi:10.1117/1.OE.55.11.115105.

d. Jose Sasian, Dmitry Reshidko, and Chia-Ling Li, "Aspheric/freeform optical surface description for controlling illumination from point-like light sources," Opt. Eng. 55(11), 115104 (Nov 25, 2016). doi:10.1117/1.OE.55.11.115104

e. Jieun Ryu, Jose Sasian, "Tolerancing a lens for LED uniform illumination," Proc. SPIE 10377, Optical System Alignment, Tolerancing, and Verification XI, 1037703 (22 August 2017); doi: 10.1117/12.2276864

f. Lerner, S.A. and J. M. Sasian, "Optical Design Using Novel Aspheric Surfaces", SPIE Annual Meeting, San Diego, Proc. SPIE 4092, 17-25, August 2000.

g. Lenny Laughlin and Jose M. Sasian, "Source modeling and calculation of mask illumination during extreme ultraviolet lithography condenser design," SPIE Proceedings Vol. 4832, 283-292, 2002.

14. Since 1995, I have been a consultant. My consulting has included designing lens or mirror systems for cell-phones, microscopes, projectors, telescopes, medical devices, optical displays, and high speed photography, as well as designing optical systems for uniform illumination. I hold patents and patent applications related to lens systems. I am familiar with electronic circuit boards and electronic test instruments. I also have worked with or designed with LEDs and other types of light sources, including light diffusers, for uniform illumination.

15. I have been a topical editor and reviewer for the peer-reviewed journals Applied Optics and Optical Engineering. I am a fellow of the International Society for Optics and Photonics (SPIE), a fellow of OPTICA (formerly the Optical Society of America), and a lifetime member of the Optical Society of India.

16. I have served as a co-chair for the conferences "Novel Optical Systems: Design and Optimization" (1997-2006), "Optical systems alignment, tolerancing, and verification" (2007-2021), and "International Optical Design Conference,"

(2002). I have taught the course: Advanced Lens Design: Art and Science in Japan (2014, 2016, and 2017). I teach the short course Mirror System Design with Freeform Surfaces at the SPIE Symposium: https://spie.org/education/courses/coursedetail/SC1272.

17. I have been a co-editor of approximately 28 published conference proceedings from SPIE. I am the author of the book, "Introduction to Aberrations in Optical Imaging Systems," by Cambridge University Press, 2013; and of the book "Introduction to Lens Design," by Cambridge University Press, 2019. I am named as an inventor on approximately 18 U.S. patents, and on 3 U.S. patent applications.

18. A more detailed summary of my background, experience, and publications is contained in my CV attached hereto as Exhibit 1003.

II. Information Considered

19. I have considered the following documents:

a. The '313 Patent (EX1001);

b. The prosecution history of the '313 Patent (EX1002);

c. US2006/0132723A1 ("Yamagishi '723") (EX1005);

d. JP2006047986A ("Itohiya '986") (EX1006);

e. US2005/0275759A1 ("Itohiya '759") (EX1007);

f. US6,542,204B1 ("Ohzawa") (EX1008);

g. JP2003248169A ("Karasawa") (EX1009);

h. US2005/0219706A1 (“Yamagishi ’706”) (EX1010);

i. US2006/0285080A1 (“Kurihara”) (EX1012).

20. In addition to the documents above, in forming the opinions expressed below, I have also considered:

a. My own knowledge and experience, as described above and in my CV; and
b. The level of skill of a POSITA at the time of the alleged invention of the ’313 Patent.

III. Obviousness

21. I have been informed and understand that a claim is obvious in light of the prior art if the difference or differences between the claimed subject matter and the prior art are such that the subject matter as a whole would have been obvious, at the time the invention was made, to a person having ordinary skill in the art. I have been informed and understand that the Supreme Court provided an outline for analyzing obviousness in which it rejected an earlier test in favor of an “expansive and flexible approach” using “common sense.” I have also been informed and understand that the Supreme Court explained that under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed. I have also been informed and understand that the Supreme Court explained that “[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” I further

have been informed and understand that the Court pointed to other factors that may show obviousness. These factors include the following principles:

a. combination that unites old elements with no change in their respective functions is unpatentable. As a result, the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results,

b. a predictable variation of a work in the same or a different field of endeavor is likely obvious if a person of ordinary skill would be able to implement the variation,

c. an invention is obvious if it is the use of a known technique to improve a similar device in the same way, unless the actual application of the technique would have been beyond the skill of the person of ordinary skill in the art. In this case, a key inquiry is whether the improvement is more than the predictable use of prior art elements according to their established functions,

d. an invention is obvious if there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims,

e. inventions that were "obvious to try" — chosen from a finite number of identified, predictable solutions, with a reasonable expectation of

success — are likely obvious,

f. known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art, and

g. an explicit teaching, suggestion, or motivation in the art to combine references, while not a requirement for a finding of obviousness, remains "a helpful insight" upon which a finding of obviousness may be based.

IV. Claim Construction

22. I have been informed and understand that, in an *inter partes* review, claim terms are construed according to their ordinary and customary meaning as understood by one of ordinary skill in the art in view of the specification and the prosecution history of the patent. Independent claim 1 of the '313 Patent reads:

1. A projection type image display apparatus, comprising:

an image display element;

a first lens group, being disposed in a light direction with respect to said image display element, which is configured to include a plural number of lenses;

a second lens group, being disposed in a light direction with respect to said first lens group, which is configured to include a plural number of lenses;

a reflection mirror, which is configured to reflect lights emitted from at least one of said first and second lens groups, so as to project upon said screen obliquely;

a first mounting base, on which said first lens group is mounted;

a second mounting base, on which said second lens group is mounted; and

a chassis, which is configured to store said first and second lens group, said reflection mirror, and said first and second mounting bases;

wherein said first mounting base is fixed at a bottom of said chassis, while said second mounting base is moveable.

23. Claims 2 and 3 both depend from claim 1. Claim 2 adds the limitation "wherein an optical axis of said first and second lens group is inclined to a normal line at a center of a surface of said image display element." Claim 3 adds the limitation "further comprising: a rod member, which makes said second mounting base movable."

24. In my opinion, the claims of the '313 Patent use terms that have ordinary and customary meanings in the art, and do not use these terms inconsistently with those ordinary and customary meanings. Therefore, it is my opinion that no terms need an explicit construction.

V. Level of Skill in the Art

25. I have been informed that obviousness is considered from the

perspective of a person of ordinary skill in the art at the time of the invention. I understand that several factors are considered in determining the level of ordinary skill in the art, including the educational level of active workers in the field, the types of problems encountered in the art, the nature of the prior art solutions to those problems, prior art patents and publications, the activities of others, the sophistication of the technology involved, and the rapidity of innovations in the field. I have been informed that the filing date of the Japanese application to which the '313 Patent claims priority is June 15, 2006.

26. In my opinion, a POSITA at the time of the invention of the '313 Patent would have had a Ph.D. in electrical engineering, physics, optical sciences, optical engineering, or a related scientific or engineering field, and at least one to two years of work or research experience in optical engineering, optical design, or a related field. Alternatively, a POSITA could have had a Bachelor's degree in one of the foregoing areas and at least three to four years of work or research experience in optical engineering, optical design, optoelectronics, or a related field.

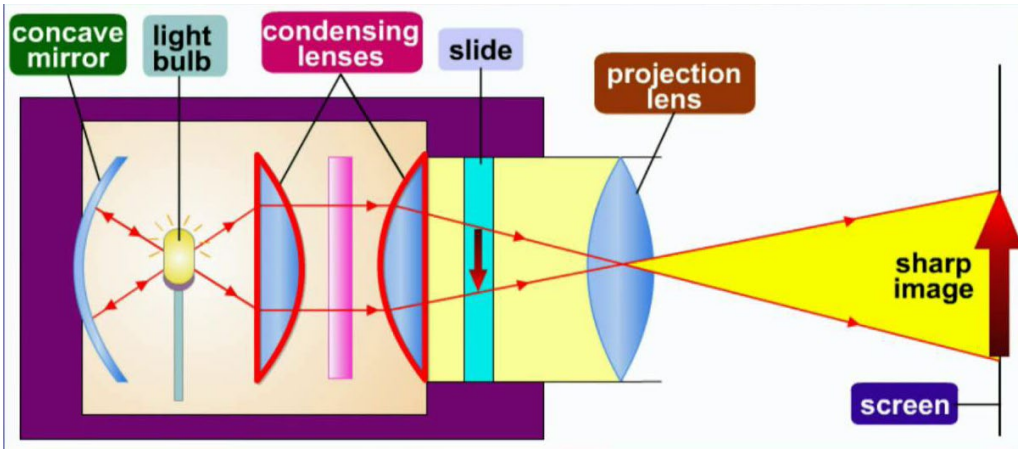
27. I met and exceeded the above qualifications for a POSITA as of at least June 15, 2006 (and thereafter), and consider myself to be a person with at least ordinary skill in the art of the '313 Patent. My experience working with undergraduate students, graduate students, postdoctoral fellows, industry professionals, and others in the relevant field provides me with significant insight on

the knowledge of a POSITA.

VI. Background on Relevant Technology

28. I provide the following background information on technology relevant to the '313 Patent based on my general knowledge and experience in the fields of optical engineering and optical science.

29. The development of optical projectors goes back to the Magic Lantern, which evolved into slide projectors, overhead projectors, and movie film projectors. With the advent of micro-photolithography, optical projectors further evolved as digital projectors, and complex projectors for the fabrication of micro-electronic circuits.

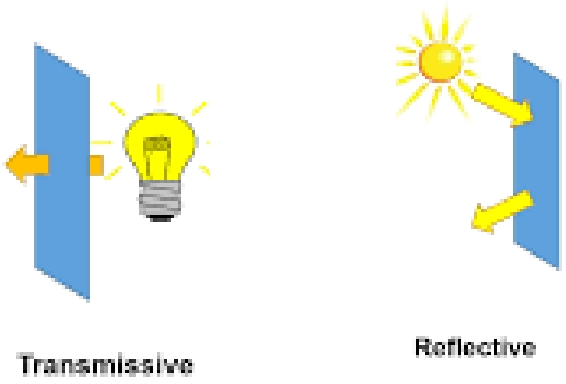


30. The main block components of an optical projector are a light source, a light condenser, a transparency or subject to be projected, a projection lens, and a screen. In all projectors, the efficient use of the available light is important. Much effort is put into minimizing light loss and minimizing loss of energy in the form of heat. Often a fan is included to remove heat from the projector components.

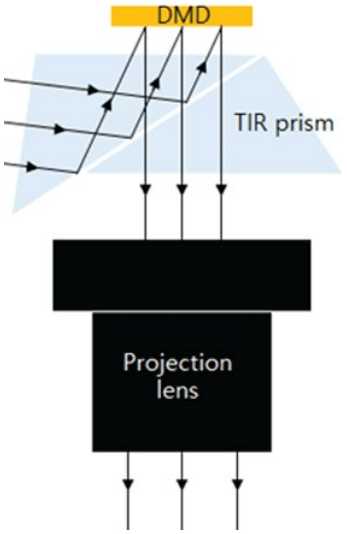
31. The condenser optics' function is to transmit as much light as possible from the light source to the slide or image display; the condenser must illuminate the slide, or image display, in a uniform manner.

32. The projection lens's function is to form an image of the slide, or image display such as a liquid crystal display (LCD) or digital micro-mirror display (DMD), on the screen. The image formed on the screen must be sharp, free of distortions, and have high contrast.

33. Early projectors used a transparency, film, or slide as the subject to be projected onto the screen. Modern digital projectors use a light valve instead. The light valve can be an LCD or a DMD. A light valve can, in addition, transmit or reflect light cast by the condenser optics.



34. Projectors that use a DMD image display work on reflecting light and may require a prism to input the light from the condenser optics.



35. Because of the need to improve the light efficiency of projectors, reduce environmental impact, and reduce cost, optical projectors have further evolved. The use of LEDs or lasers as the light sources has permitted this progress.

36. The projection lens is often a multi-lens element so that sharp images can be cast at high contrast.

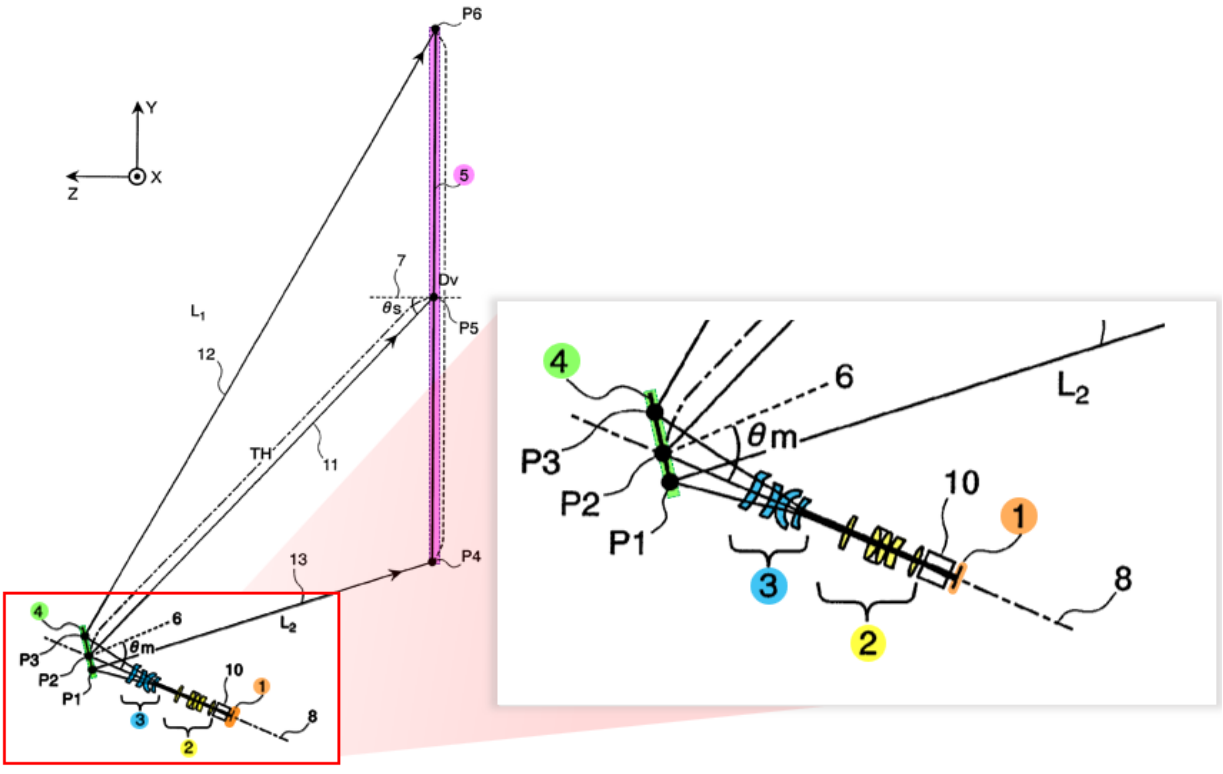
VII. U.S. Patent No. 7,850,313 (the "'313 Patent")

37. I have been informed and understand that the earliest priority date to which the Patent Owner may claim the '313 Patent is entitled is June 15, 2006. For purposes of my analysis herein, I am assuming that the '313 Patent is entitled to this priority date. I understand that all of the references discussed below qualify as prior art based on this assumed priority date of June 15, 2006.

38. The '313 Patent describes a projection type image apparatus. EX1001, abstract. The described apparatus includes an image display element, a first lens group disposed in a light direction with respect to the image display element and

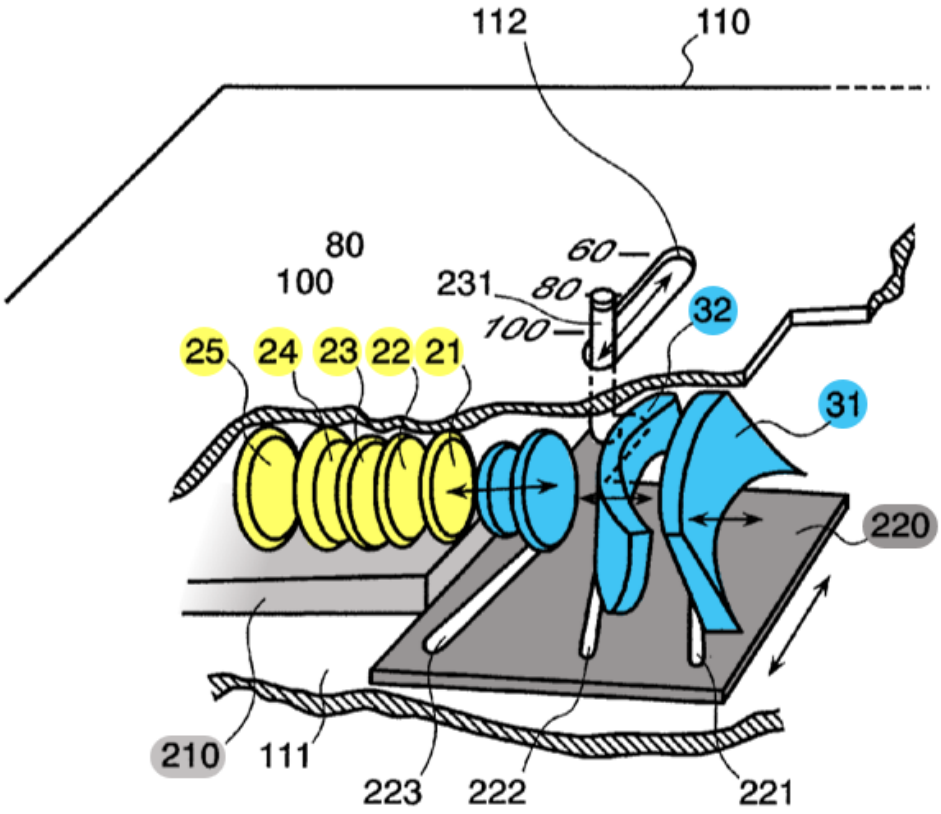
configured to include a plurality of lenses, a second lens group disposed in a light direction with respect to the first lens group and configured to include a plurality of lenses, a reflection mirror configured to reflect lights emitted from the first and/or second lens groups so as to project upon a screen obliquely, a first mounting base on which the first lens group is mounted, a second mounting base on which the second lens group is mounted, and a chassis configured to store the first and second lens groups, the reflection mirror, and the first and second mounting bases. *Id.* The first mounting base is fixed at a bottom of the chassis, while the second mounting base is moveable. *Id.*

39. The '313 Patent's Fig. 2, annotated below, depicts a cross-section of an embodiment of the claimed projection type image apparatus.



40. This figure shows an image display element 1 (orange), a first lens group 2 (yellow), a second lens group 3 (blue), a reflection mirror 4 (green), and a screen 5 (purple). EX1001, 4:61-5:43. Light is emitted from light source 8, passes through the image display element 1, the first lens group 2, and the second lens group 3, and then reflects from the reflection mirror 4 and is projected onto the screen 5 at an oblique angle θs. *Id.* The patent explains that "an oblique incidence of the light upon the screen produces various kinds of aberrations, including so-called a trapezoidal distortion, *i.e.*, an oblong configuration of projection from the image display element 1 becomes a trapezoid, and also other than that, due to the rotational asymmetry to the optical axis, etc., but according to the present invention, those are compensated upon the reflection surfaces of the rear lens group 3 … and also those of the reflection optic system." *Id.*, 6:8-16.

41. The '313 Patent also discloses and claims mounting bases for the front and rear lens groups. *Id.*, abstract. These are shown in Fig. 23(a), annotated below:



42. The patent explains that "on two (2) sets of mounting bases 210 and 220 are mounted the above-mentioned front lens group 2 (the rotationally symmetric lenses 21-25) and the above-mentioned rear lens group 3 (lenses 31-34), respectively." *Id.*, 29:32-36. The patent then describes how one mounting base (light gray) is fixed, while the other mounting base (dark gray) is moveable. "[U]pon one of the mounting bases (for example, the mounting base 210) are fixed the above-mentioned front lens group 2 (the rotationally symmetric lenses 21-25) at the predetermined positions thereof." *Id.*, 29:36-39. "[O]n the other mounting base (for example, the mounting base 220) are formed grooves 221, 222 and 223, in advance, and also that mounting base 220 is

installed within the apparatus to be movable with respect to the mounting base 210 mentioned above." *Id.*, 29:40-45.

43. The patent also describes an embodiment where a cylinder or barrel-shaped structure is used as a mounting base for the moveable lens group. "[I]t is also possible to achieve the [moveable lens] effect similar to that mentioned above, with using a cylinder, on an outer periphery of which are formed such the grooves as mentioned above, for example." *Id.*, 30:6-9. "Further, with using a driving means including an electric motor therein, for example, it is also possible to adopt the structures, so that the rear lens group 3 (i.e., the lenses 31-34) can be move[d], respectively." *Id.*, 30:18-21.

44. The '313 Patent issued on December 14, 2010 from U.S. Patent Application No. 12/825,836, filed June 29, 2010. The patent claims priority as a continuation of application No. 11/763,465, filed on June 15, 2007 and which became U.S. Patent No. 7,766,488. EX1002. It further claims foreign priority to Japanese Application No. 2006-166434, filed on June 15, 2006. *Id.* The claims of the '313 Patent were allowed without any rejections or amendments via a Notice of Allowance that was mailed on August 5, 2010. EX1002 at 202-05.

45. As discussed below, the claims of the '313 Patent recite nothing more than an obvious combination of optical and mechanical elements that had been used by POSITAs for many years prior to the filing of the '313 Patent.

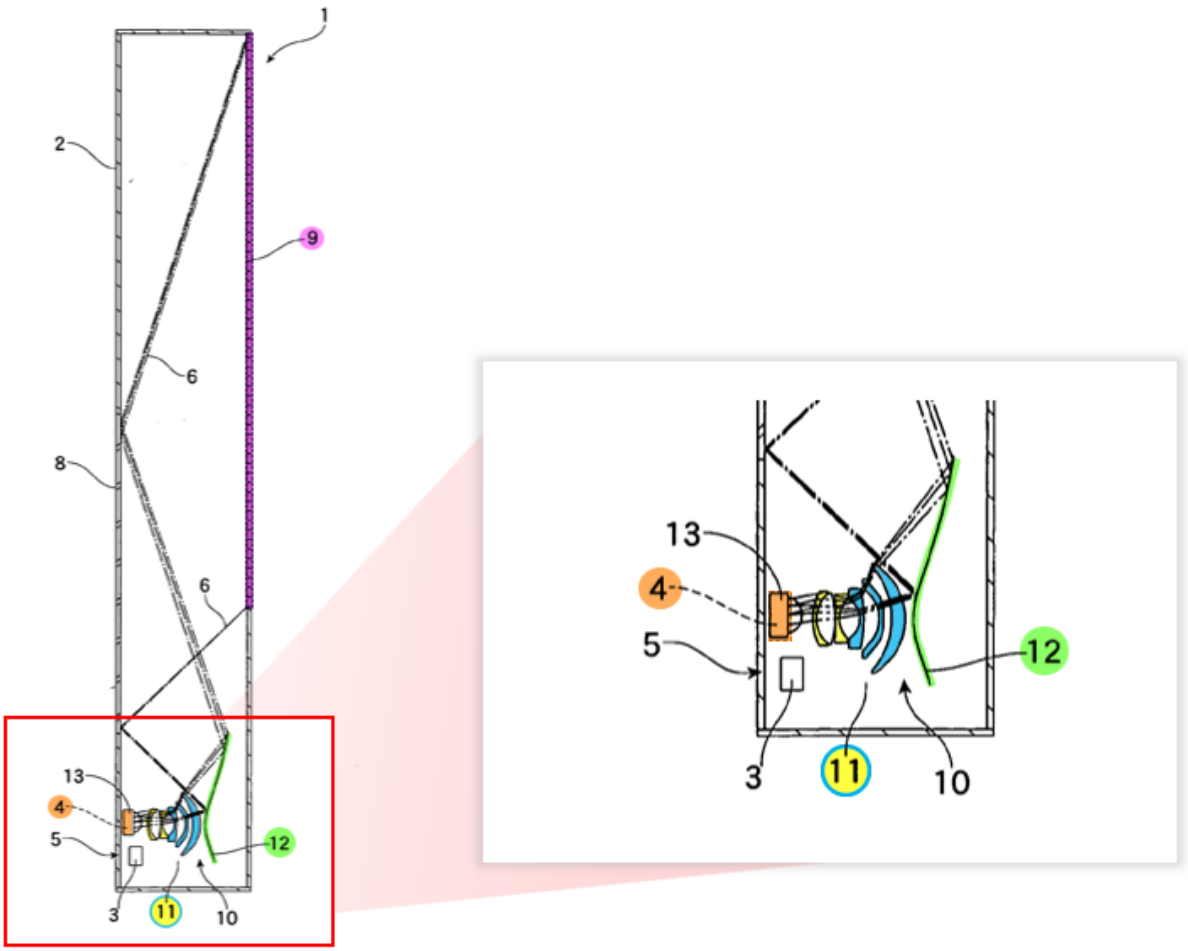
VIII. Prior Art

A. Yamagishi ‘723 (EX1005)

46. Yamagishi ‘723 was filed as U.S. Application No. 11/299,042 on December 9, 2005 and published as U.S. Publication No. 2006/0132723 on June 22, 2006. EX1005. I understand that Yamagishi ‘723 is prior art to the ’313 Patent and was not considered by the Examiner during prosecution of the ’313 Patent.

47. Yamagishi ‘723 generally discloses an optical system and rear projector. EX1005, title. The optical system comprises a lens system on which projection light from an image generating device is incident; and an aspherical mirror with negative power that is disposed on an optical path between the lens system and a screen, wherein a curvature of the aspherical mirror in the radial direction changes positive to negative on a way from a center to a periphery thereof. *Id.*, abstract.

48. Fig. 1 of Yamagishi ‘723, annotated below, shows the overall arrangement of a rear projector in accordance with Yamagishi ‘723’s invention. EX1005, [0022].



49. Yamagishi '723 explains that "[t]he rear projector 1 includes, inside a housing 2, a large screen 9, an image generating device 5 including a light source 3 and a light modulator (light valve) 4 that modulates emitted light from the light source 3 based on an image signal (data or information) to generate images, a projection optical system 10 that projects projection light 6 from the image generating device 5 onto the screen 9 from the rear surface thereof, and a large flat mirror 8 that reflects the projection light 6 and guides the projection light 6 to the screen 9." EX1005, [0022].

50. Additionally, "[t]he optical system 10 includes the lens system 11 on

which the projection light 6 that has been modulated by the light valve 4 of the image generating device 5 is incident and an aspherical mirror 12 with negative power as a whole. The aspherical mirror 12 is provided at a position facing the large flat mirror 8 on the optical paths between the lens system 11 and the screen 9." *Id.*, [0024].

B. Itohiya '986 (EX1006)

51. Itohiya '986 was filed as Japanese Application No. 2005-164091 on June 3, 2005 and published as Japanese Publication No. 2006-47986 on February 16, 2006. EX1006. I understand that Itohiya '986 is prior art to the '313 Patent and was not considered by the Examiner during prosecution of the '313 Patent.

52. Itohiya '986 discloses an optical device. EX1006, title. At least a portion of a lens system in the optical device can easily be adjusted in a precise fashion. *Id.*, abstract. And at least a portion of the adjusted lens system can be stably affixed without the risk of causing eccentricity. *Id*.

53. Figure 2 of Itohiya '986, reproduced below, depicts a cross-section of the optics and lens barrel in an embodiment of Itohiya '986's invention:

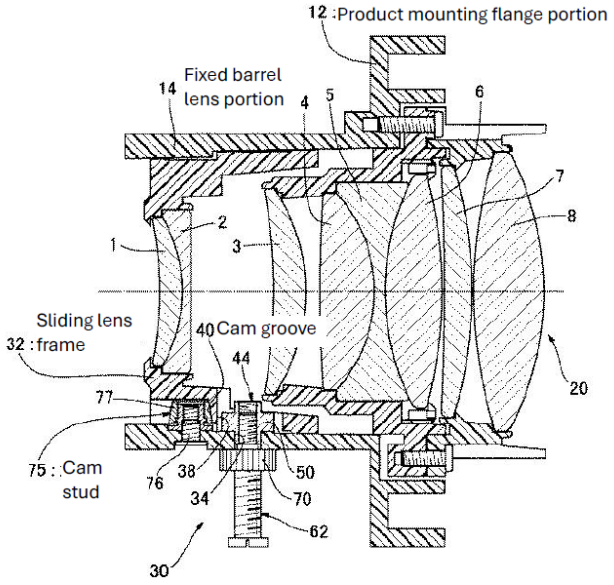


FIG. 2

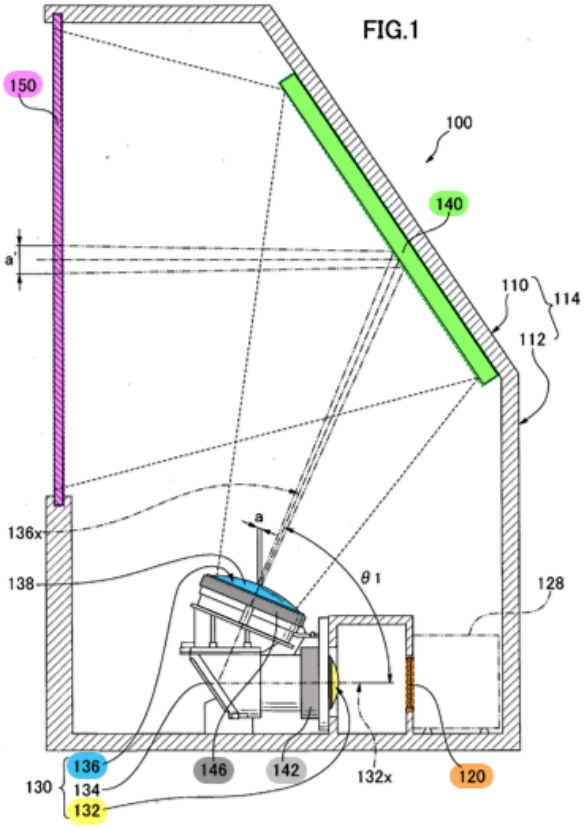
54. Itohiya ’986 explains that “[a]n imaging lens 20 consisting of lenses 1-8, as shown in Figure 2, is disposed within fixed lens-barrel portion 14. Lenses 3-8 are supported more fixedly in a known constitution. Lenses 1 and 2, whose position on the optical axis greatly affects the image formation performance and focal length of imaging lens 20, are supported in such a way that [their] position on the optical axis can be adjusted by a lens position adjustment mechanism 30.” *Id.*, [0023].

C. Itohiya ’759 (EX1007)

55. Itohiya ’759 was filed as U.S. Application No. 10/935,147 on September 8, 2004 and published as U.S. Publication No. 2005/0275759 on December 15, 2005. EX1007. I understand that Itohiya ’759 is prior art to the ’313 Patent and was not considered by the Examiner during prosecution of the ’313 Patent.

56. Itohiya ’759 discloses a rear-projection type imaging apparatus.

EX1007, abstract. Figure 1 of Itohiya '759, annotated below, depicts a cross-section of a rear-projection television set in accordance with Itohiya '759's invention:



57. Itohiya '759 explains that "[t]he rear-group optical system 132 is disposed forward of the image display element 120. The rear-group optical system 132 is supported within a lens barrel 142 which can be formed by aluminum die-casting or of an engineering plastic (e.g., polycarbonate, PPS, etc.). Referring to FIG. 2, it is particularly preferred that the barrel 142 for the rear-group optical system is firmly supported on the lower cabinet 112 using any fastening means such as screw fastening. The intermediate mirror 134 is disposed forward of the rear-group optical system 132. The intermediate mirror 134 includes an intermediate mirror

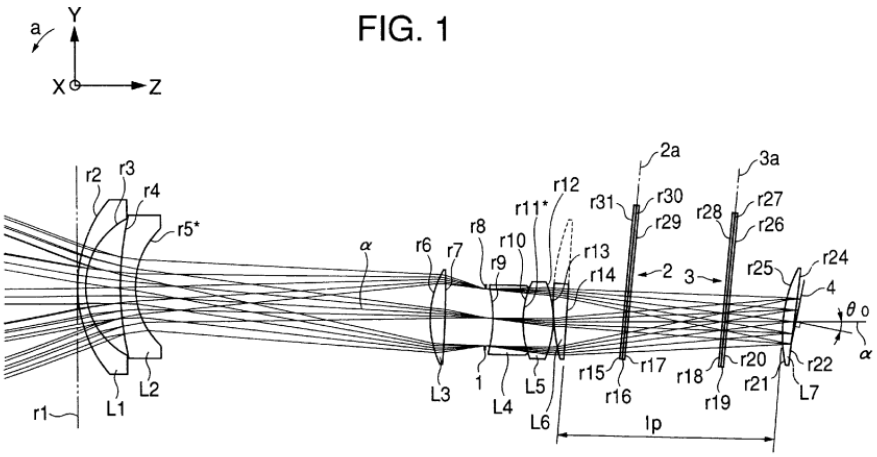
retaining member 144 which is supported on the barrel 132 for the rear-group optical system using any fastening means such as fitting/fixing means." *Id.*, [0041].

D. Ohzawa (EX1008)

58. Ohzawa was filed as U.S. Application No. 09/493,268 on January 28, 2000 and issued as U.S. Patent No. 6,542,204 on April 1, 2003. EX1008. I understand that Ohzawa is prior art to the '313 Patent and was not considered by the Examiner during prosecution of the '313 Patent.

59. Ohzawa discloses a display optical system that has an illumination optical system for emitting illumination light, a plurality of reflection-type display devices, a projection optical system, and a plane-parallel mirror. EX1008, abstract. Ohzawa's Fig. 1, reproduced below, is "a diagram illustrating the construction of the projection optical system employed in the display optical system of a first embodiment of the present invention…." *Id.*, 3:30-32.

FIG. 1



60. Ohzawa explains that "[a]lthough not shown, in reality, on the left-hand

side of what is shown in FIG. 1 is disposed an object plane (a screen). The projection optical system is provided with, from the object-plane side, lens elements L1, L2, and L3, an aperture stop 1, lens elements L4 to L6, plane- parallel mirrors 2 and 3, a lens element L7 acting as a condenser lens, and a reflection-type display device 4 composed of a reflection-type LCD and acting as an image plane. Note that reference symbol a indicates the optical axis of the projection optical system." *Id.*, 3:44-53.

61. The angle θo shown on the right side of Fig. 1 is "the angle between a normal to the surface of the reflection-type display device 4 and the optical axis α." *Id.*, 5:57-59. Ohzawa further discloses that θo should be in the range of $5°<\theta o<15°$, and thus that the optical axis should be at an incline relative to the normal to the surface of the reflection-type display device 4. *Id.*, 5:33-37. Ohzawa explains that "[i]f this angle is equal to or less than the lower limit of the condition noted above, it is impossible to design the optical system to allow separation of illumination and projection light. In contrast, if the angle is equal to or greater than the upper limit of the condition, it is impossible to correct the trapezoidal distortion and the coma aberration caused by oblique projection from the reflection-type display device without increasing the number of decentered lens elements and also increasing the decentering amount of those decentered lens elements. This leads to an undesirable increase in manufacturing cost." *Id.*, 5:59-6:2.

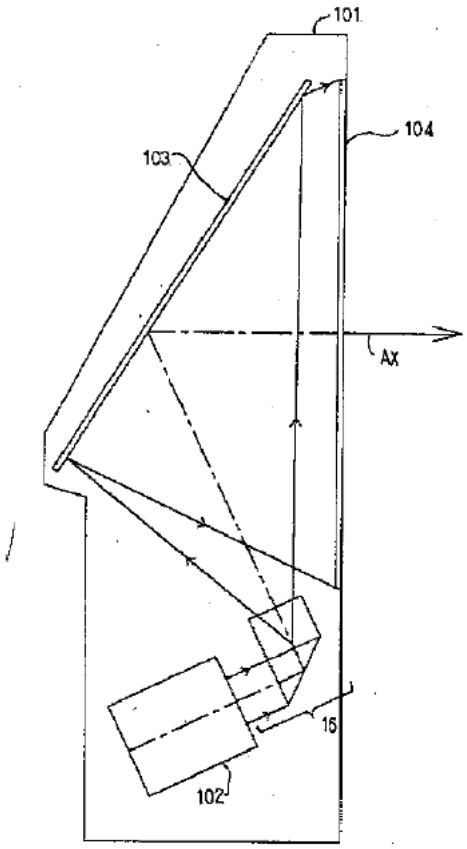
E. Karasawa (EX1009)

62. Karasawa was filed as Japanese Application No. 2002-46988 on February 22, 2002 and published as Japanese Publication No. 2003-248169 on September 5, 2003. EX1009. I understand that Karasawa is prior art to the '313 Patent and was not considered by the Examiner during prosecution of the '313 Patent.

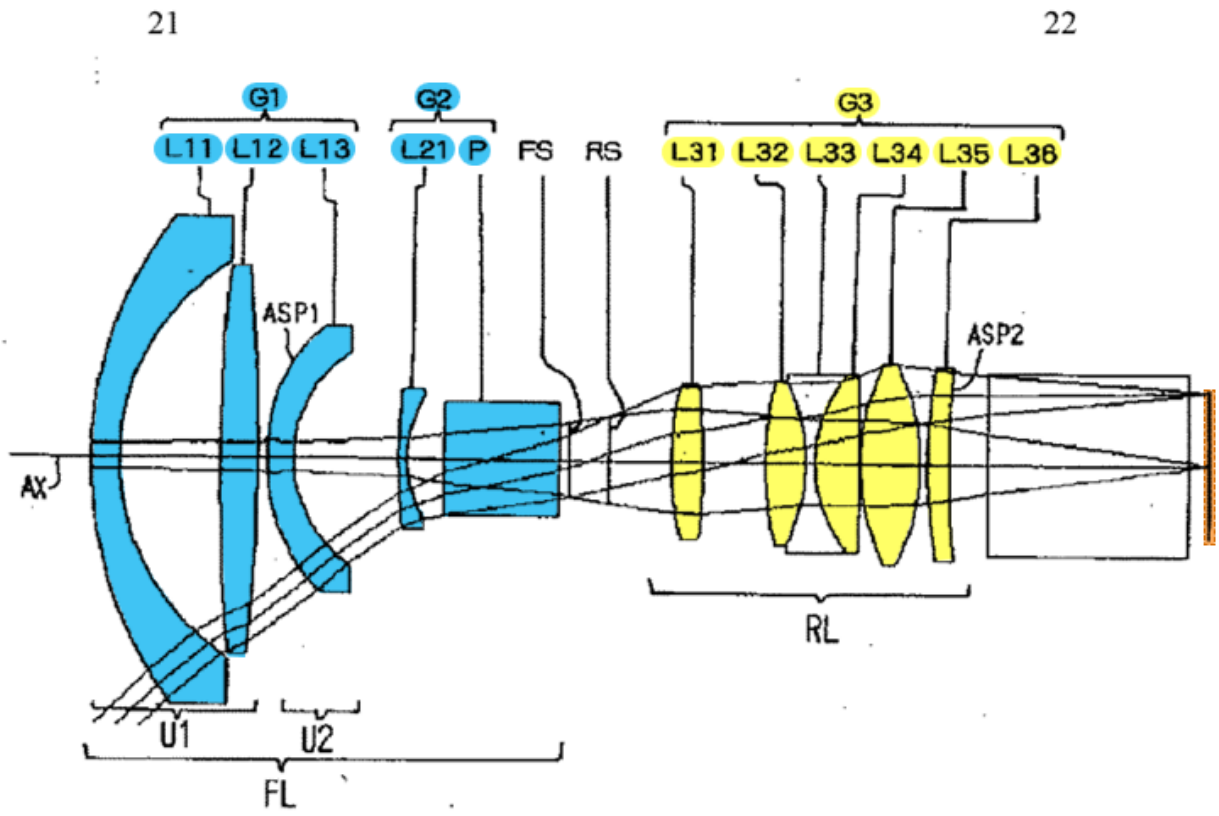
63. Karasawa is directed to a projection lens and projector with three lens groups. EX1009, abstract. Karasawa explains that "a projector can be provided that includes an lighting optical system that emits illumination light, a light modulation device that modulates illumination light emitted from the lighting optical system in response to an image signal, and a projection lens for projecting an optical image formed in the light modulation device to a predetermined surface, and that is characterized by using the projection lens according to the first invention as the projection lens. This results in a small, thin projector with a large angle of view and bright projections. The color synthesis optical system can also be positioned on the light modulator side of the projection lens while having sufficient optical performance and telecentricity. Therefore, a projector can be provided that can reduce the color shaking caused by the angular properties of the color synthesis optical system." *Id.*, [0022]. Karasawa discloses that its light modulation device can be, for example, a transparent liquid crystal device or a reflective liquid crystal

panel. *Id.*, [0079], [0095]. Karasawa's Fig. 7 is reproduced below:

[FIG. 7]



64. Karasawa further explains how "FIG. 1 is a diagram illustrating lens configuration of a projection lens according to the first embodiment of the present invention. From the screen side, in order, it is comprised of the first lens group G1 having negative power, the second lens group G2 having negative power, and the third lens group G3 having positive power." *Id.*, [0024]. Karasawa's Fig. 1 is annotated below:

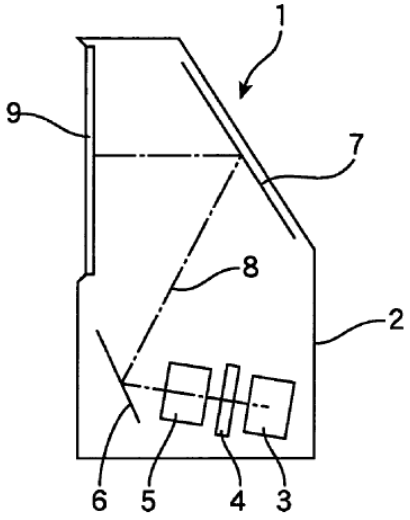


F. Yamagishi '706 (EX1010)

65. Yamagishi '706 was filed as U.S. Application No. 11/087,477 on March 23, 2005 and published as U.S. Publication No. 2005/0219706 on October 6, 2005. EX1010. I understand that Yamagishi '706 is prior art to the '313 Patent and was not considered by the Examiner during prosecution of the '313 Patent.

66. Yamagishi '706 is directed to a projection lens system that projects projection light from a light modulator onto a screen and which is telecentric on an input side. *Id.*, abstract. Yamagishi '706's Fig. 1 is reproduced below:

Fig. 1



67. Yamagishi '706 teaches that "[t]he rear projector 1 shown in FIG. 1 includes, inside a housing 2, a light source 3, a light modulator (light valve) 4 that modulates light from the light source 3 according to an image signal to form an image, a projection lens system 5 that projects projection light 8 from the light valve 4 onto a screen 9 from the rear surface side, and mirrors 6 and 7 that reflect and guide the projection light 8 to the screen 9." *Id.*, [0006]. Further, "[t]his lens system 5 is a retrofocus-type lens system in which lens groups with negative and positive powers are disposed from the screen side, and is telecentric on input side that is side of the light valve 4, which makes the lens system suited to a projector in which the light valve 4 is a liquid crystal panel or a DMD." *Id.*, [0030]. Yamgishi '706 specifically discloses that its light valve 4 can be a liquid crystal panel. *Id.*, [0014]. Yamagishi '706's primary description is "based on a fixed focal length lens-type lens system

where no lenses aside from the focusing lenses move, but the present invention can also be applied to a zoom lens system in which a lens or lens group for zooming also moves." *Id.*, [0064].

IX. Analysis And Identification Of How The Claims Are Unpatentable

A. Yamagishi '723 in View of Itohiya '986 and Itohiya '759 Renders Claims 1 and 3 Obvious

68. In my opinion and for the reasons explained below, Yamagishi '723, in view of Itohiya '986 and Itohiya '759, renders obvious the subject matter recited by claims 1 and 3 of the '313 Patent.

69. As a threshold matter, a POSITA would have been motivated to combine the teachings of Yamagishi '723 with those of Itohiya '986 and Itohiya '759—and would have had a reasonable expectation of success in making the combination—for a number of reasons. All three of these references are directed to optical systems that project light from an image-generating device onto a screen by way of groups of lenses. *See, e.g.*, EX1005, abstract; EX1006, [0001], [0014]; EX1007, abstract. Yamagishi '723 is directed to "[a]n optical system that projects projection light from an image generating device, onto a screen," where the optical system comprises a lens system and an aspherical mirror. EX1005, abstract. Itohiya '986 is directed to "optical devices such as rear-projection televisions and rear-projection projectors or other rear-projection video equipment which project enlarged images onto a screen from the rear" and "has the object of providing an

optical device with which the position of at least part of a lens system on the optical axis can be easily adjusted, and in which at least part of the adjusted lens system can be stably fixed for a long period of time…." EX1006, [0001], [0014]. Itohiya '759 is directed to "[a] rear-projection type imaging apparatus, for example, rear-projection television set, capable of projecting, and displaying, an enlarged image onto a screen from the rearward thereof." EX1007, abstract. Accordingly, the references are in the same field of endeavor and POSITAs would naturally have looked to all of them in their work in this area. Moreover, a POSITA would have understood that the teachings of Yamagishi '723 would have been compatible and operable in combination with the teachings of Itohiya '986 and Itohiya '759 to enhance Yamagishi '723.

70. A POSITA would further have recognized that Itohiya '986 specifically describes the benefits of having certain lenses in a rear projection system be moveable while other lenses in the system are fixed in place. In particular, Itohiya '986 explains that "[t]he optical device of the present invention has the effect that at least a part of the lens system can be easily precisely adjusted, and at least a part of the adjusted lens system can be stably fixed without eccentricity." EX1006, [0020]. To a POSITA, this would have been a matter of common sense because it would have been desirable to have some of the lenses in the projection system be moveable in order to allow for the precise focusing and/or magnification of a projected image

on a screen. Itohiya '986 further explains that "[t]he optical device of the present invention also has the effect of enabling the constitution of an optical device of desired high precision without requiring the preparation of many spacing rings, without requiring large costs, and without requiring man-hours to select among and build in many components." *Id.*, [0021]. A POSITA would thus have been motivated to take advantage of these benefits by combining Itohiya '986's disclosures with those of Yamagishi '723.

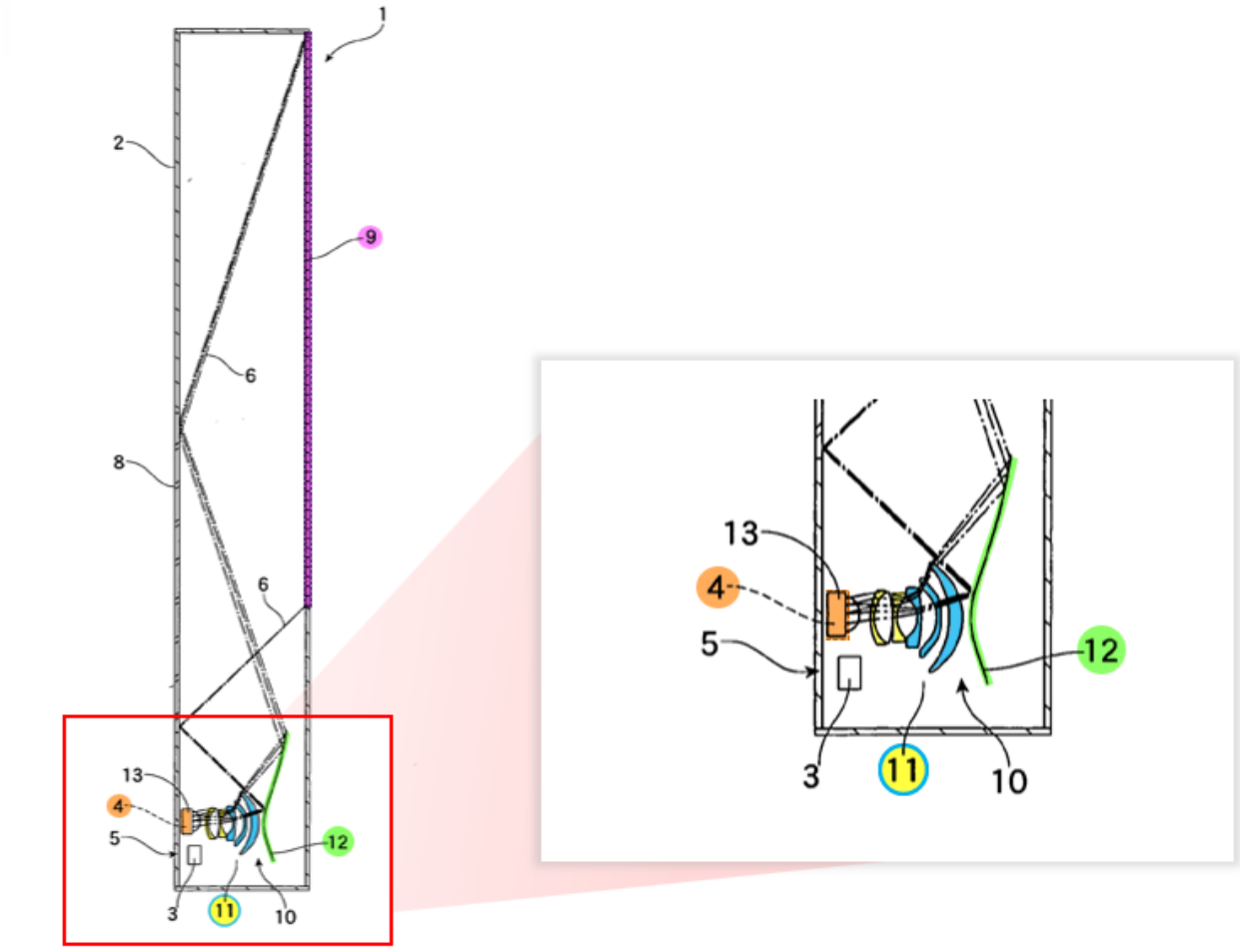
71. Additionally, a POSITA would have recognized that Itohiya '759 describes details of how the fixed lenses in a system with both fixed and moveable lenses are firmly supported on the lower part of the optical system's chassis. EX1007, [0040]-[0041]. Particularly because Itohiya '986 and Itohiya '759 share the same named inventor, a POSITA looking at Itohiya '986's teachings relating to systems with fixed and moveable lenses would naturally have looked to Itohiya '759 for additional implementation details for such systems.

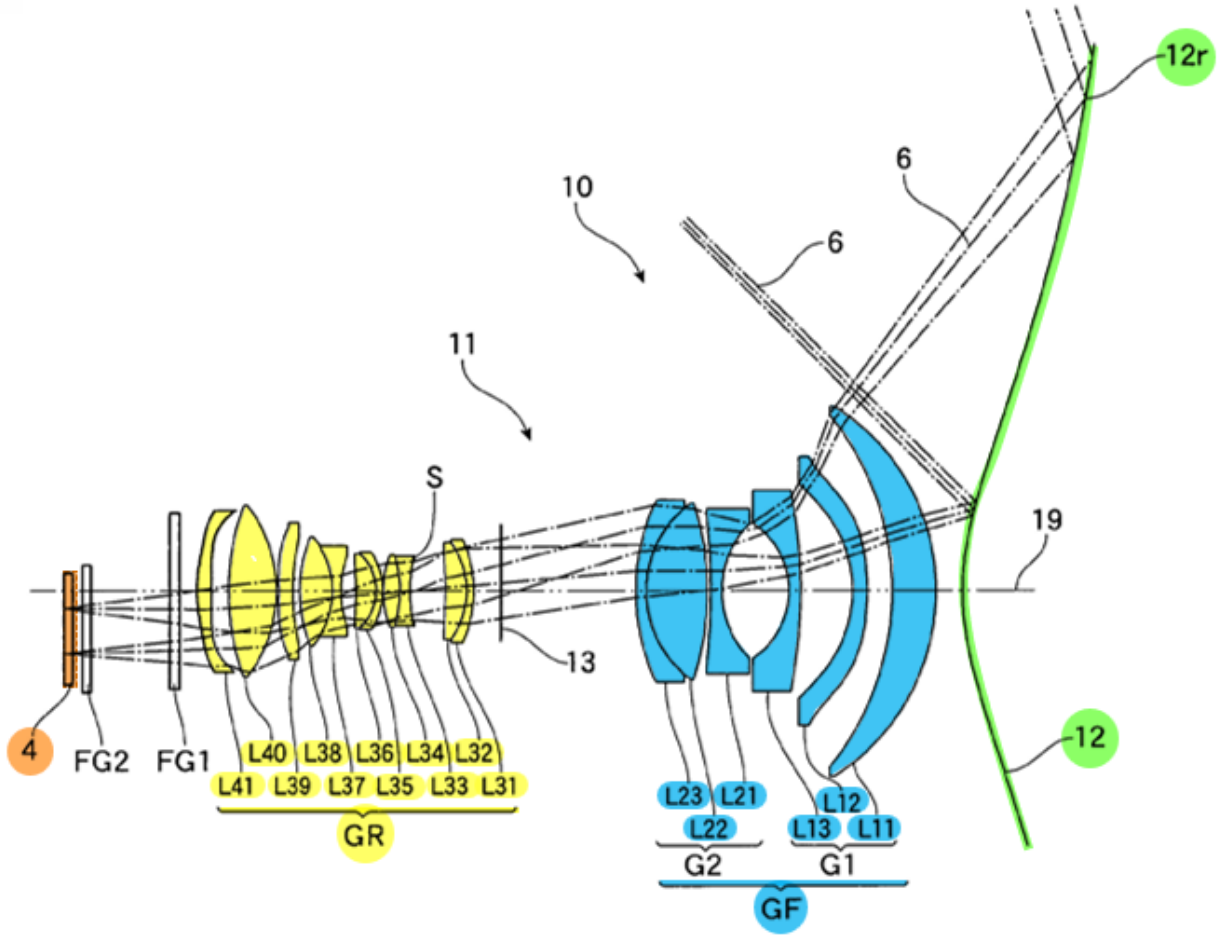
72. Ultimately, a POSITA would have been motivated to combine the teachings of Yamagishi '723 with those of Itohiya '986 and Itohiya '759, and would have recognized that combining these teachings would have produced predictable and operable results. I will now discuss how these prior art references apply to claims 1 and 3 of the '313 Patent on an element-by-element basis.

1. Independent Claim 1

[1.0] A projection type image display apparatus, comprising;

73. Yamagishi ’723 discloses a projection type image display apparatus. Yamagishi ‘723’s Figures 1 and 3 are annotated below:





74. Yamagishi '723 teaches that "[t]he present invention relates to an optical system that magnifies and projects projection light that has been modulated by an image generating device such as a liquid crystal device, DMD, based on image information onto a screen, and to a rear projector that uses the same." EX1005, [0002].

[1.1] an image display element;

75. Yamagishi '723 discloses that its projection type image display apparatus includes an image display element.

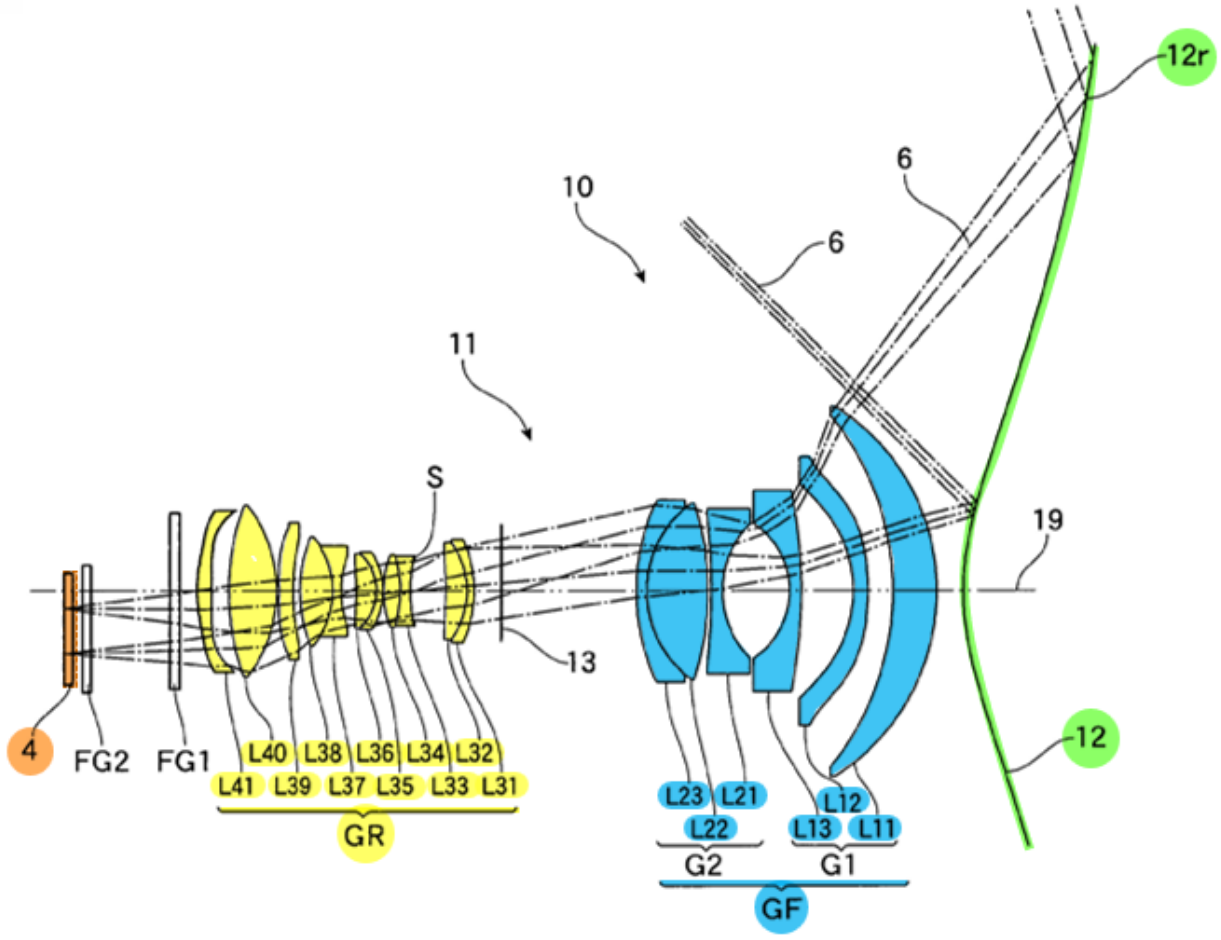
76. Yamagishi '723 discloses "a light modulator (light valve) 4 that

modulates emitted light from the light source 3 based on an image signal (data or information) to generate images." *Id.*, [0022]. Further, "[t]he present invention relates to an optical system that magnifies and projects projection light that has been modulated by an image generating device such as a liquid crystal device, DMD, based on image information onto a screen, and to a rear projector that uses the same." *Id.*, [0002]. A POSITA would have understood that a "light modulator" such as a liquid crystal device or DMD (Digital Micromirror Device) is an image display element as claimed.

[1.2] a first lens group, being disposed in a light direction with respect to said image display element, which is configured to include a plural number of lenses;

77. Yamagishi '723 discloses that its projection type image display apparatus includes a first lens group, being disposed in a light direction with respect to said image display element, which is configured to include a plural number of lenses.

78. Yamagishi '723's first lens group is shown in Fig. 3 below.



79. Yamagishi '723 teaches that "[t]he lens system 11 is composed of a front group GF with a negative refractive power that is disposed on the projection side (the screen 9 side), that is, the aspherical mirror 12 side and *a rear group GR with a positive refractive power that is disposed on the image generating device 5 side*." *Id.*, [0024] (emphasis added). Yamagishi '723's "rear group GR" corresponds to the "first lens group" claimed in the '313 Patent. As shown in Fig. 3, this rear group of lenses is proximate to the image display element (light modulator) 4 and is disposed in a light direction with respect to the image display element.

80. Further, Yamagishi '723's rear group of lenses clearly includes a plural number of lenses. Yamagishi '723 explains that "[t]he rear group GR is composed of a total of eleven lenses …." *Id.*, [0029].

[1.3] a second lens group, being disposed in a light direction with respect to said first lens group, which is configured to include a plural number of lenses;

81. Yamagishi '723 discloses that its projection type image display apparatus includes a second lens group, being disposed in a light direction with respect to said first lens group, which is configured to include a plural number of lenses.

82. The second lens group corresponds to the "front group GF" shown in Yamagishi '723's Fig. 3 above. "The lens system 11 is composed of *a front group GF with a negative refractive power that is disposed on the projection side (the screen 9 side)*, that is, the aspherical mirror 12 side and a rear group GR with a positive refractive power that is disposed on the image generating device 5 side." *Id.*, [0024] (emphasis added). As shown in Fig. 3, this front group of lenses is proximate to the aspherical mirror 12 and is disposed in a light direction with respect to the first (rear) lens group.

83. Further, Yamagishi '723's front group of lenses clearly includes a plural number of lenses. Yamagishi '723 explains that "[t]he front group GF includes, in order from the projection side, that is, the aspherical mirror 12 side, a

first lens group G1 with negative refractive power and a second lens group G2 with positive refractive power…." *Id.*, [0025].

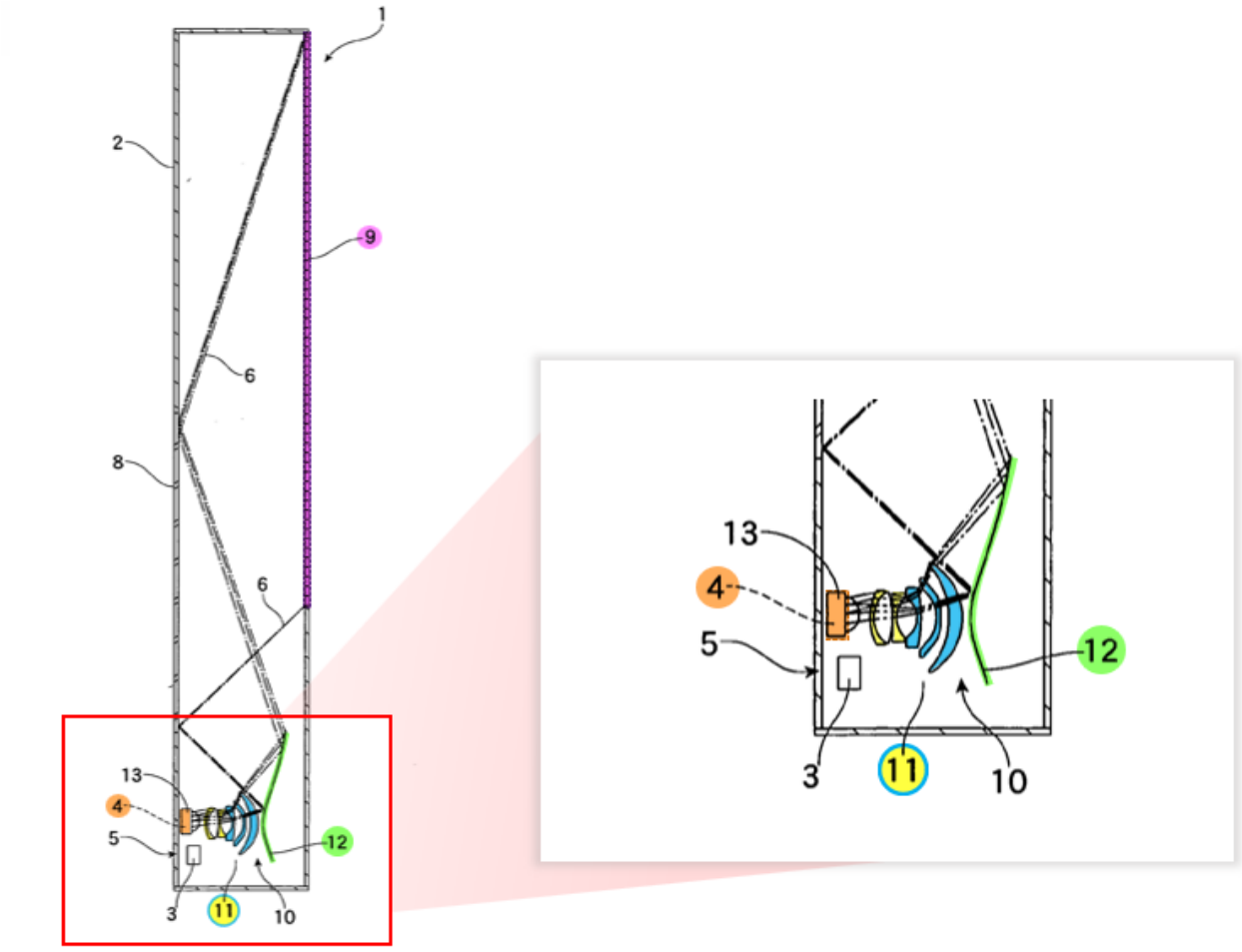
[1.4] a reflection mirror, which is configured to reflect lights emitted from at least one of said first and second lens groups, so as to project upon said screen obliquely;

84. Yamagishi '723 discloses that its projection type image display apparatus includes a reflection mirror, which is configured to reflect lights emitted from at least one of said first and second lens groups, so as to project upon said screen obliquely.

85. The claimed "reflection mirror" corresponds to Yamagishi '723's aspherical mirror 12, shown in Fig. 3 above. "The aspherical mirror 12 is provided at a position facing the large flat mirror 8 on the optical paths between the lens system 11 and the screen 9." *Id.*, [0024]. "Since the aspherical mirror 12 whose curvature in the radial direction falls from a center of the mirror toward the periphery with the sign of the curvature becoming inverted on the way is used, it is possible to favorably correct aberration across the entire screen using an optical system with rotational symmetry that is easy to align instead of using an optical system that is asymmetrical about the optical axis, such as a system including an anamorphic aspherical surface or a free-form surface." *Id.*, [0073]. "Accordingly, by combining this lens system with the aspherical mirror 12 that has a negative power, it is possible to project the projection light 6 onto the screen 9 with a large incident angle." *Id.*,

[0069].

86. The aspherical mirror 12 projects upon the screen 9 obliquely, as shown in Fig. 1:



87. As shown here, light reflects from the aspherical mirror 12, hits and is reflected from the flat mirror 8 obliquely, and then hits the screen 9 obliquely. *Id.* The aspherical mirror 12 is thus "configured to reflect lights emitted from at least one of said first and second lens groups, so as to project upon said screen obliquely" as claimed. *Id.*

[1.5] a first mounting base, on which said first lens group is

mounted;

88. While Yamagishi '723's first lens group must inherently be mounted on something, Yamagishi '723 does not expressly disclose a first mounting base on which its first lens group is mounted. However, Itohiya '986 discloses such a first mounting base for a first lens group, and it would have been obvious to combine Itohiya '986's disclosure in this regard with Yamagishi '723.

89. Itohiya '986 generally states that "[t]he present invention pertains to optical devices such as rear-projection televisions and rear-projection projectors or other rear-projection video equipment which project enlarged images onto a screen from the rear, and optical devices such as high-resolution surveillance cameras, especially optical devices requiring high-precision optical adjustment and the maintenance of the optical stability of the lens system." EX1006, [0001].

90. Itohiya '986 further discloses that "[o]ptical device 10 of the first embodiment is a projection lens system for rear-projection type video equipment such as rear-projection televisions and rear-projection projectors. *As shown in Figure 1, optical device 10 has a product mounting flange portion 12 and a fixed lens barrel portion 14 integrally molded from synthetic resin material.* An imaging lens 20 consisting of lenses 1-8, as shown in Figure 2, is disposed within fixed lens-barrel portion 14. *Lenses 3-8 are supported more fixedly in a known constitution*." *Id.*, [0023] (emphasis added). Itohiya '986's Figs 1 and 2 are reproduced below:

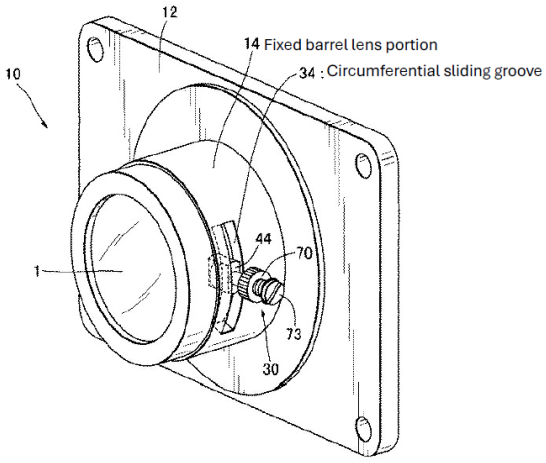


FIG. 1

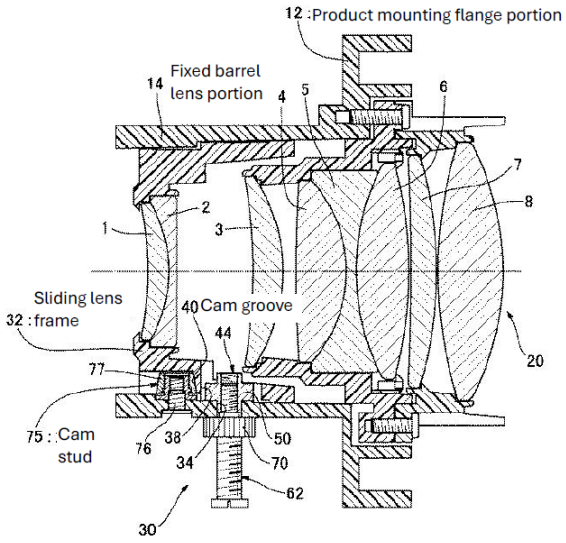


FIG. 2

[1.6] a second mounting base, on which said second lens group is mounted; and

91. While Yamagishi '723's second lens group must inherently be mounted on something, Yamagishi '723 does not expressly disclose a second mounting base on which its second lens group is mounted. However, Itohiya '986 discloses such a second mounting base for a second lens group, and it would have been obvious to combine Itohiya '986's disclosure in this regard with Yamagishi '723.

92. Itohiya '986 discloses that "Lenses 1 and 2, whose position on the optical axis greatly affects the image formation performance and focal length of imaging lens 20, are supported in such a way that [their] position on the optical axis can be adjusted by a lens position adjustment mechanism 30." EX1006, [0023].

93. Itohiya '986 further teaches that, "as shown in Figures 1 and 2, [the device] is assembled so that the three cam studs 75 are respectively cam-engaged in each of the cam grooves 40 on sliding lens frame 32. At the same time, adjustment

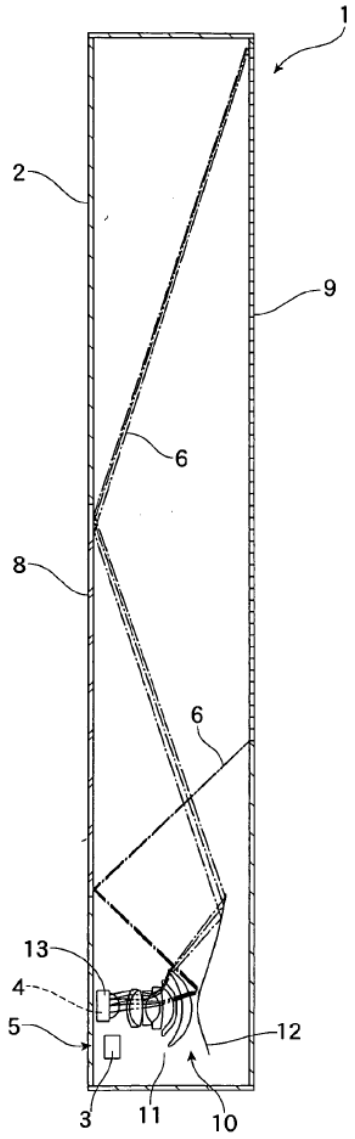
fixing screw 62 is screwed into threaded hole 64 on sliding stud 44, wherein columnar part 50 is slidably engaged with straight sliding groove 38. In this state, cam groove 40 is guided by cam stud 75 through the rotation of adjustment fixing screw 62 around the optical axis. I.e., when adjustment fixing screw 62 is rotated around the optical axis, columnar part 50 moves within straight sliding groove 38. *As a result, lenses 1 and 2, supported by sliding lens frame 32, move along the optical axis, adjusting the position of the lenses 1 and 2*." *Id.*, [0029] (emphasis added).

[1.7] a chassis, which is configured to store said first and second lens group, said reflection mirror, and said first and second mounting bases;

94. Yamagishi '723 discloses that its projection type image display apparatus includes a chassis, which is configured to store the first and second lens group and the reflection mirror. Moreover, in the combined system with Itohiya '986, the chassis would also store the first and second mounting bases.

95. Yamagishi '723's housing 2 is shown in Fig. 1, reproduced below, and corresponds to the claimed chassis.

Fig. 1



96. Yamagishi ‘723 teaches that “FIG. 1 shows the overall arrangement of a rear projector according to the one of the aspect of the present invention. The rear projector 1 includes, *inside a housing 2*, a large screen 9, an image generating device 5 including a light source 3 and a light modulator (light valve) 4 that modulates emitted light from the light source 3 based on an image signal (data or information) to generate images, a projection optical system 10 that projects projection light 6

from the image generating device 5 onto the screen 9 from the rear surface thereof, and a large flat mirror 8 that reflects the projection light 6 and guides the projection light 6 to the screen 9." EX1005, [0022] (emphasis added).

97. Yamagishi '723's Fig. 1 shows the housing 2 storing the first and second lens groups and the reflection mirror. Further, a POSITA would understand that, in the combination with Itohiya '986, the housing 2 would also store the first and second mounting bases for the first and second lens groups. These mounting bases would naturally be placed inside the same chassis as the lens groups that they are supporting, as taught by Yamagishi Fig. 1.

[1.8] wherein said first mounting base is fixed at a bottom of said chassis, while said second mounting base is moveable.

98. Yamagishi '723 does not expressly disclose a first mounting base fixed at a bottom of the chassis of its projection type display apparatus, or a second mounting base that is moveable. As discussed above in connection with limitations [1.5] and [1.6], Itohiya '986 discloses a fixed first mounting base and a moveable second mounting base. However, Itohiya '986 may not specifically disclose the details of how its first mounting base is fixed at a bottom of a chassis. A POSITA would therefore look to Itohiya '759 for such additional details out of the need to mount the lenses.

99. In this regard, Itohiya '759 discloses that "[t]he rear-group optical system 132 is disposed forward of the image display element 120. *The rear-group*

optical system 132 is supported within a lens barrel 142 which can be formed by aluminum die-casting or of an engineering plastic (e.g., polycarbonate, PPS, etc.). Referring to FIG. 2, it is particularly preferred that the barrel 142 for the rear-group optical system is firmly supported on the lower cabinet 112 using any fastening means such as screw fastening." EX1007, [0041] (emphasis added).

100. Accordingly, the combination of Yamagishi '723, Itohiya '986, and Itohiya '759 discloses a projection type display apparatus wherein the first mounting base is fixed at a bottom of the chassis, while the second mounting base is moveable.

2. Dependent Claim 3

[3.0/3.1] The projection type image display apparatus, according to claim 1, further comprising: a rod member, which makes said second mounting base movable.

101. Yamagishi '723 may not expressly disclose a rod member that makes a second mounting base moveable. However, Itohiya '986 discloses such a rod member that makes a second mounting base moveable, and it would have been obvious to combine Itohiya '986's disclosure in this regard with Yamagishi '723. Itohiya '986's Figs. 1 and 2 are reproduced below:

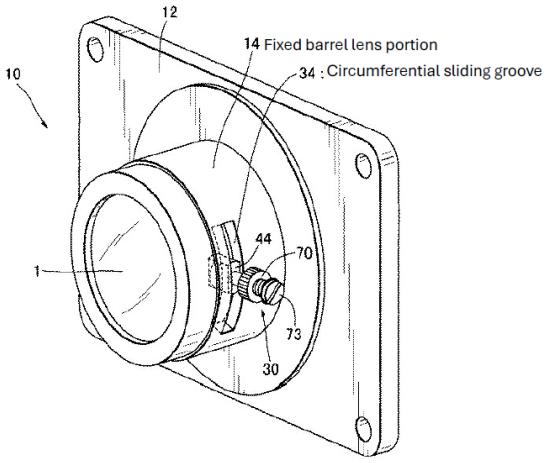


FIG. 1

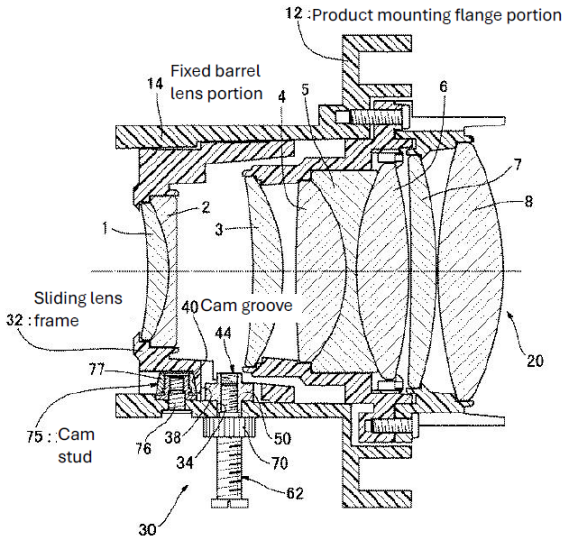


FIG. 2

102. Itohiya '986 discloses that "[f]irst, as shown in Figures 1 and 2, [the device] is assembled so that the three cam studs 75 are respectively cam-engaged in each of the cam grooves 40 on sliding lens frame 32. At the same time, *adjustment fixing screw 62* is screwed into threaded hole 64 on sliding stud 44, wherein columnar part 50 is slidably engaged with straight sliding groove 38. In this state, cam groove 40 is guided by cam stud 75 through the rotation of adjustment fixing screw 62 around the optical axis. I.e., *when adjustment fixing screw 62 is rotated around the optical axis, columnar part 50 moves within straight sliding groove 38. As a result, lenses 1 and 2, supported by sliding lens frame 32, move along the optical axis, adjusting the position of the lenses 1 and 2*." EX1006, [0029] (emphasis added). Itohiya '986's adjustment fixing screw 62 corresponds to the '313 Patent's claimed "rod member," and makes the second mounting base moveable.

103. Thus, Yamagishi '723, in view of Itohiya '986 and Itohiya '759,

discloses or renders obvious each limitation of claims 1 and 3.

B. Yamagishi '723 in View of Itohiya '986, Itohiya '759, and Ohzawa Renders Claim 2 Obvious

104. In my opinion and for the reasons explained below, Yamagishi '723, in view of Itohiya '986, Itohiya '759, and Ohzawa, renders obvious the subject matter recited by claim 2 of the '313 Patent.

105. As a threshold matter, a POSITA would have been motivated to further combine Ohzawa with the combined system of Yamagishi '723, Itohiya '986, Itohiya '759, and would have had a reasonable expectation of success in making the combination. As Ohzawa explains, there are significant benefits to having the optical axis of the lens groups be at an incline relative to a normal line at a center of a surface of the image display element. *See* EX1008, 5:59-6:2. For example, this arrangement allows the illumination light to be separated from the projection light, thereby avoiding undesirable interference between the illumination and projection light. *Id.* Moreover, arranging the lenses and image display element in this way allows a designer to obtain the benefits of avoiding interference between the illumination and projection light while correcting the trapezoidal distortion and the coma aberration caused by oblique projection without needing to increase the number of lens elements or the decentering amount of the lens elements, and thus without increasing the manufacturing cost of the system. *Id.* Further, tilting an image display element relative to an optical axis was a well-known technique in the

projector art in the relevant timeframe.[1] *See, e.g.*, EX1012, abstract. This is particularly true for systems—like those disclosed in Yamagishi '723—that may use a reflective liquid crystal device as an image display element. *See* EX1005, [0002]. A POSITA would thus have been motivated to combine Ohzawa's teachings with those of Yamagishi '723, Itohiya '986, Itohiya '759. I will now discuss how these prior art references apply to claim 2 of the '313 Patent on an element-by-element basis.

1. Claim 2

[2.0/2.1] The projection type image display apparatus, according to claim 1, wherein an optical axis of said first and second lens group is inclined to a normal line at a center of a surface of said image display element.

106. Ohzawa discloses a projection type image display apparatus wherein an optical axis of first and second lens groups is inclined to a normal line at a center of a surface of an image display element. As discussed above, the angle θo shown on the right side of Ohzawa's Fig. 1 is "the angle between a normal to the surface of the reflection-type display device 4 and the optical axis α." EX1008, 5:57-59. Ohzawa further discloses that θo should be in the range of $5° < \theta o < 15°$, and thus that the

[1] A POSITA would have further known that, for compensating the trapezoidal distortion and focusing caused by a tilted image display element, it would have been beneficial to also tilt the screen on which the image is ultimately projected. *See* EX1012, [0014]. In other words, the central ray (and other rays) of a projected image from the tilted image display element would contact the screen at an oblique angle.

optical axis should be at an incline relative to the normal to the surface of the reflection-type display device 4. *Id.*, 5:33-37. Ohzawa explains that "[i]f this angle is equal to or less than the lower limit of the condition noted above, it is impossible to design the optical system to allow separation of illumination and projection light. In contrast, if the angle is equal to or greater than the upper limit of the condition, it is impossible to correct the trapezoidal distortion and the coma aberration caused by oblique projection from the reflection-type display device without increasing the number of decentered lens elements and also increasing the decentering amount of those decentered lens elements. This leads to an undesirable increase in manufacturing cost." *Id.*, 5:59-6:2.

107. Thus, Yamagishi '723, in view of Itohiya '986, Itohiya '759, and Ohzawa, discloses or renders obvious each limitation of claim 2.

C. Itohiya '759 in View of Itohiya '986 Renders Claims 1 and 3 Obvious

108. In my opinion and for the reasons explained below, Itohiya '759, in view of Itohiya '986, renders obvious the subject matter recited by claims 1 and 3 of the '313 Patent.

109. As a threshold matter, a POSITA would have been motivated to combine the teachings of Itohiya '759 with the teachings of Itohiya '986—and would have had a reasonable expectation of success in making the combination—for a number of reasons. Both of these references are directed to optical systems that

project light from an image generating device onto a screen by way of lenses. *See, e.g.*, EX1006, [0001], [0014]; EX1007, abstract. Accordingly, the references are in the same field of endeavor and POSITAs would naturally have looked to them in their work. Moreover, a POSITA would have understood that the teachings of Itohiya '759 would have been compatible and operable in combination with the teachings of Itohiya '986. *Id.*

110. Particularly because Itohiya '759 and Itohiya '986 share the same named inventor, a POSITA looking at Itohiya '759's teachings relating to rear projection optical systems would naturally have looked to Itohiya '986 for additional ideas on how to implement and/or improve such systems.

111. For example, a POSITA would have recognized that Itohiya '986 describes the benefits of having certain lenses in a rear projection system be moveable while other lenses in the system are fixed in place. Itohiya '986 explains that "[t]he optical device of the present invention has the effect that at least a part of the lens system can be easily precisely adjusted, and at least a part of the adjusted lens system can be stably fixed without eccentricity." EX1006, [0020]. Itohiya '986 further explains that "[t]he optical device of the present invention also has the effect of enabling the constitution of an optical device of desired high precision without requiring the preparation of many spacing rings, without requiring large costs, and without requiring man-hours to select among and build in many components." *Id.*,

[0021]. A POSITA would thus have been motivated to take advantage of these benefits by combining Itohiya '986's disclosures with those of Itohiya '759.

112. Additionally, a POSITA would have recognized that Itohiya '986 describes details of how the moveable lenses in a system with both fixed and moveable lenses can be moved and adjusted. *Id.*, [0023], [0029]. Particularly because Itohiya '986 and Itohiya '759 share the same named inventor, a POSITA looking at Itohiya '759's teachings relating to systems with fixed and moveable lenses would naturally have looked to Itohiya '986 for additional implementation details for such systems.

113. Ultimately, a POSITA would have been motivated to combine the teachings of Itohiya '759 with those of Itohiya '986, and would have recognized that combining these teachings would have produced predictable and operable results. I will now discuss how these prior art references apply to claims 1 and 3 of the '313 Patent on an element-by-element basis.

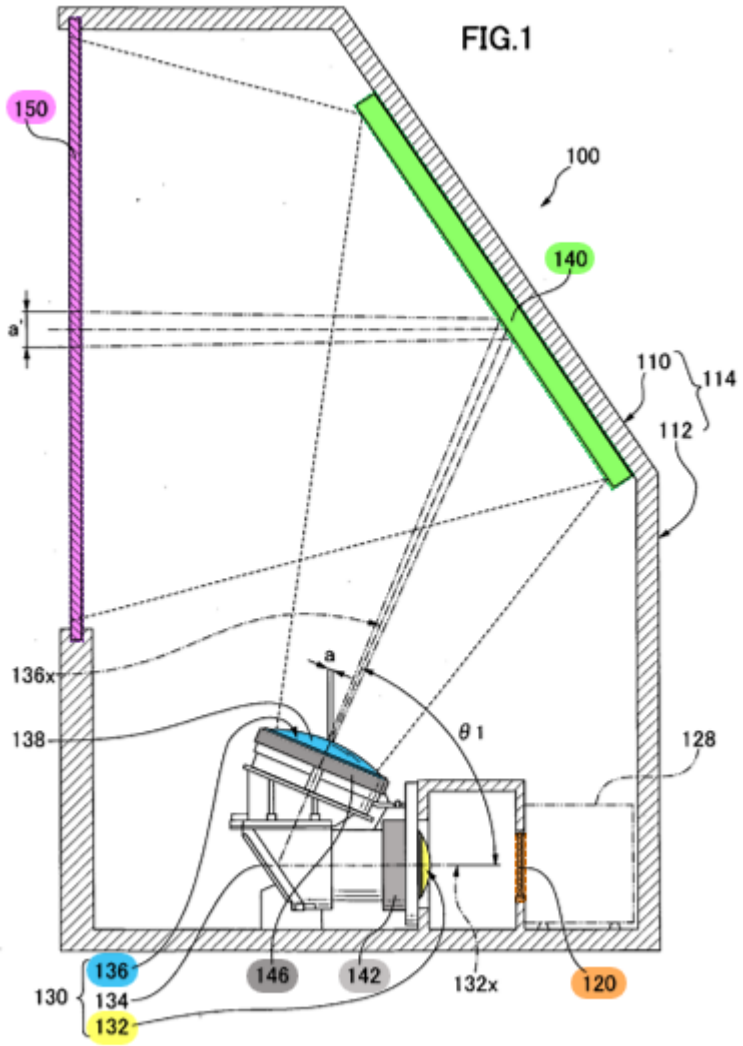
1. Independent Claim 1

[1.0] A projection type image display apparatus, comprising;

114. Itohiya '759 discloses a projection type image display apparatus. For example, Itohiya '759 teaches that "[t]he present invention relates to a rear-projection type imaging apparatus which can project, and display, an enlarged image onto a screen from the rearward thereof, such as rear-projection television sets or

rear projectors. In particular, the present invention relates to a rear-projection type imaging apparatus configured to reduce vibration in a projection lens system due to sounds coming out of woofers." EX1007, [0002].

115. Itohiya '759's Fig. 1 is annotated below:



[1.1] an image display element;

116. Itohiya '759 discloses a projection type image display apparatus that includes an image display element. Itohiya '759 teaches that "[t]he image display

element 120 may be in the form of a liquid crystal panel. A projection lens system 130 is disposed in the central portion of the lower cabinet 112 forward of the image display element 120 for enlarging and projecting the image displayed by the image display element 120." *Id.*, [0037].

[1.2] a first lens group, being disposed in a light direction with respect to said image display element, which is configured to include a plural number of lenses;

117. Itohiya '759 discloses a projection type image display apparatus that includes a first lens group, being disposed in a light direction with respect to said image display element, which is configured to include a plural number of lenses.

118. Itohiya '759 teaches that "[t]he projection lens system 130 comprises a rear-group optical system 132 including a plurality of convex lenses for converging rays from the image displayed by the image display element 120 …. The rear-group optical system 132 may comprise a single convex lens or a combination of one or more convex lenses with one or more concave lenses." *Id.*, [0040]. As shown in Fig. 1, the first lens group (rear-group optical system 132) is disposed in a light direction with respect to the image display element 120. And Itohiya '759 specifically describes how its rear-group optical system 132 includes a "plurality," *i.e.*, a plural number, of lenses. *Id.*, [0040].

[1.3] a second lens group, being disposed in a light direction with respect to said first lens group, which is configured to include a plural number of lenses;

119. Itohiya '759 discloses a projection type image display apparatus that

includes a second lens group, being disposed in a light direction with respect to said first lens group, which is configured to include a plural number of lenses.

120. Itohiya '759 teaches that "[t]he projection lens system 130 comprises … a front-group optical system 136 including a plurality of concave lenses … The front-group optical system 136 may comprise a single concave lens or a combination of one or more concave lenses with one or more convex lenses." *Id.*, [0040]. Itohiya '759 specifically describes how its front-group optical system 136 includes a "plurality," *i.e.*, a plural number, of lenses. *Id.*

121. Itohiya '759 further describes how "the image projection system 130 may be configured so that the optical axes of the front-group and rear-group optical systems 136, 132 will be aligned with each other without the provision of the intermediate mirror 134." *Id.*, [0040]. The '313 incorporates a folding mirror (35) between the lens groups; see Fig. 27. Accordingly, Itohiya '759 describes how the second lens group (front-group optical system 136) is disposed in a light direction with respect to the first lens group (rear-group optical system 132).

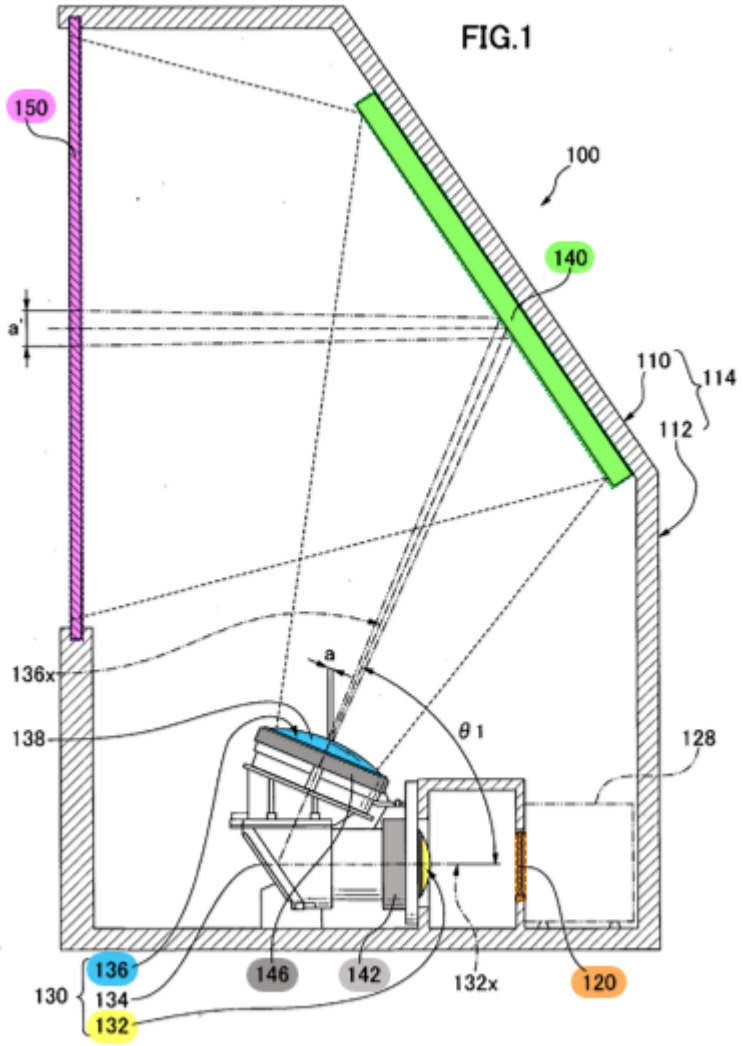
[1.4] a reflection mirror, which is configured to reflect lights emitted from at least one of said first and second lens groups, so as to project upon said screen obliquely;

122. Itohiya '759 discloses a projection type image display apparatus that includes a reflection mirror, which is configured to reflect lights emitted from at least one of said first and second lens groups, so as to project upon said screen obliquely.

123. Itohiya ‘759 teaches that “[t]he image display element 120 may be in the form of a liquid crystal panel. A projection lens system 130 is disposed in the central portion of the lower cabinet 112 forward of the image display element 120 for enlarging and projecting the image displayed by the image display element 120. An image projecting mirror 140 is disposed on the rearward part of the upper cabinet 110 for reflecting the image projected by the projection lens system 130 and projecting it onto a screen from the backward thereof.” *Id.*, [0037].

124. Further, “[p]referably, the image projecting mirror 140 is fixedly mounted and supported on the rearward part of the upper cabinet 110. The reflecting face of the image projecting mirror 140 is oriented at an angle of 60 degrees relative to the horizontal plane. The reflecting face of the image projecting mirror 140 may be positioned at any angle other than 60 degrees relative to the horizontal plane. Alternatively, the imaging apparatus may comprise a plurality of image projecting mirrors. Furthermore, the imaging apparatus may be configured so that a projection lens system can project an image onto a screen from the backward thereof without the use of the image projecting mirror.” *Id.*

125. Itohiya ‘759’s projection mirror 140 is shown in Fig. 1, reproduced below:



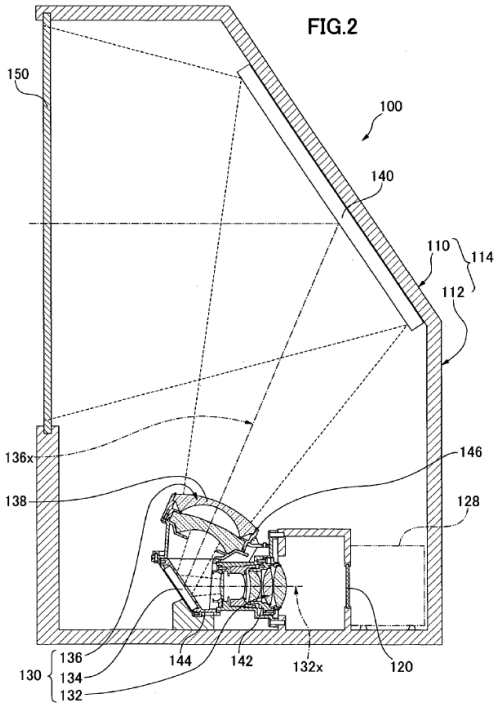
126. As shown in Fig. 1, light is reflected from the projection mirror 140 such that it projects onto screen 150 obliquely.

[1.5] a first mounting base, on which said first lens group is mounted;

127. Itohiya ’759 discloses a projection type image display apparatus that includes a first mounting base, on which said first lens group is mounted.

128. Itohiya ’759 teaches that “[t]he rear-group optical system 132 is disposed forward of the image display element 120. The rear-group optical system

132 is supported within a lens barrel 142 which can be formed by aluminum die-casting or of an engineering plastic (e.g., polycarbonate, PPS, etc.)." *Id.*, [0041]. Itohiya '759 further teaches that, "[r]eferring to FIG. 2, it is particularly preferred that the barrel 142 for the rear-group optical system is firmly supported on the lower cabinet 112 using any fastening means such as screw fastening." *Id.* Itohiya '759's Fig. 2 is reproduced below:



[1.6] a second mounting base, on which said second lens group is mounted; and

129. Itohiya '759 discloses a projection type image display apparatus that includes a second mounting base, on which said second lens group is mounted.

130. Itohiya '759 teaches that "[t]he front-group optical system 136 is supported within a barrel 146 for the front-group optical system. The barrel 146 can

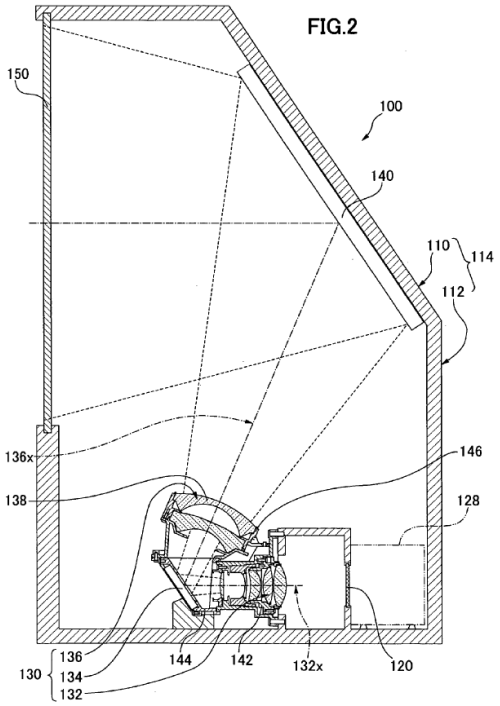
be made of aluminum die-casting or of an engineering plastic (e.g., polycarbonate, PPS, etc.)." *Id.*, [0041].

[1.7] a chassis, which is configured to store said first and second lens group, said reflection mirror, and said first and second mounting bases;

131. Itohiya '759 discloses a projection type image display apparatus that includes a chassis, which is configured to store said first and second lens group, said reflection mirror, and said first and second mounting bases.

132. Itohiya '759 teaches that "[t]he rear-projection television set (100) comprises *a housing (114)*, …." *Id.*, abstract (emphasis added). Further, "[t]he rear-projection television set 100 comprises a housing 114 for receiving various components. The housing 114 preferably includes an upper cabinet 110 and a lower cabinet 112. Alternatively, the housing 114 may be of an integral structure without dividing into upper and lower cabinets." *Id.*, [0035].

133. As shown in Fig. 2, the chassis (housing 114) is configured to store the first and second lens groups, reflection mirror, and first and second mounting bases:



[1.8] wherein said first mounting base is fixed at a bottom of said chassis, while said second mounting base is moveable.

134. Itohiya '759 discloses that the first mounting base is fixed at a bottom of the chassis. For example, Itohiya '759 teaches that "[t]he rear-group optical system 132 is supported within a lens barrel 142 which can be formed by aluminum die-casting or of an engineering plastic (e.g., polycarbonate, PPS, etc.). Referring to FIG. 2, it is particularly preferred that the barrel 142 for the rear-group optical system is firmly supported on the lower cabinet 112 using any fastening means such as screw fastening." *Id.*, [0041].

135. Itohiya '759 further discloses that "the front-group optical system 136 may be configured to include one or more lenses which are movable to perform the focusing of the optical systems in the direction of optical axis." *Id.*, [0040].

However, Itohiya '759 may not expressly disclose that the second mounting base itself is moveable. Itohiya '986, though, discloses this, and it would have been obvious to combine Itohiya '986 with Itohiya '759.

136. For example, Itohiya '986 discloses in connection with its Fig. 2 that "[l]enses 3-8 are supported more fixedly in a known constitution. Lenses 1 and 2, whose position on the optical axis greatly affects the image formation performance and focal length of imaging lens 20, are supported in such a way that [their] position on the optical axis can be adjusted by a lens position adjustment mechanism 30." EX1006, [0023]. Itohiya '986's Fig. 2 is reproduced below:

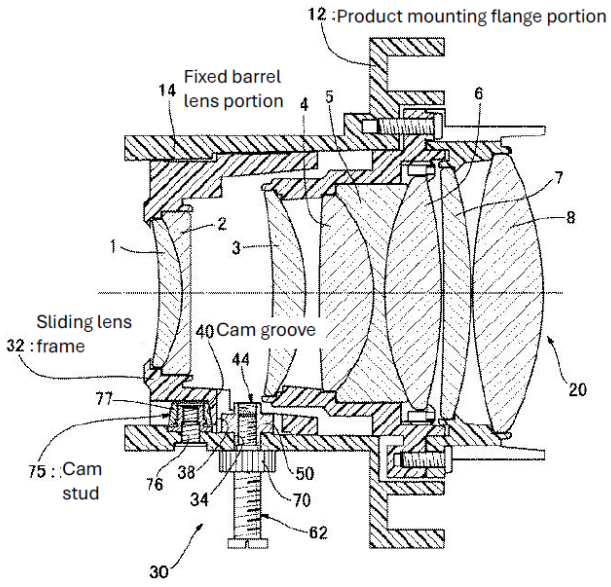


FIG. 2

137. Itohiya '986 further explains that "as shown in Figures 1 and 2, [the device] is assembled so that the three cam studs 75 are respectively cam-engaged in each of the cam grooves 40 on sliding lens frame 32. At the same time, adjustment fixing screw 62 is screwed into threaded hole 64 on sliding stud 44, wherein

columnar part 50 is slidably engaged with straight sliding groove 38. In this state, cam groove 40 is guided by cam stud 75 through the rotation of adjustment fixing screw 62 around the optical axis. I.e., when adjustment fixing screw 62 is rotated around the optical axis, columnar part 50 moves within straight sliding groove 38. As a result, lenses 1 and 2, supported by sliding lens frame 32, move along the optical axis, adjusting the position of the lenses 1 and 2." *Id.*, [0029]. Accordingly, Itohiya '986 discloses that the second mounting base is moveable. When Itohiya '986's disclosure in this regard is combined with Itohiya '759, the combined structure has a first mounting base that is fixed at a bottom of the chassis, while the second mounting base is moveable.

2. Dependent Claim 3

[3.0/3.1] The projection type image display apparatus, according to claim 1, further comprising: a rod member, which makes said second mounting base movable.

138. Itohiya '986 discloses a rod member, which makes the second mounting base movable. As shown in Itohiya '986's Fig. 2 reproduced above, "adjustment fixing screw 62 is screwed into threaded hole 64 on sliding stud 44, wherein columnar part 50 is slidably engaged with straight sliding groove 38. In this state, cam groove 40 is guided by cam stud 75 through the rotation of adjustment fixing screw 62 around the optical axis. I.e., when adjustment fixing screw 62 is rotated around the optical axis, columnar part 50 moves within straight sliding groove 38.

As a result, lenses 1 and 2, supported by sliding lens frame 32, move along the optical axis, adjusting the position of the lenses 1 and 2." EX1006, [0029]. Itohiya '986's adjustable fixing screw 62 makes the second mounting base moveable and corresponds to the claimed rod member.

139. Thus, Itohiya '759, in view of Itohiya '986, discloses or renders obvious each limitation of claims 1 and 3.

D. Itohiya '759 in View of Itohiya '986 and Ohzawa Renders Claim 2 Obvious

140. In my opinion, Itohiya '759, in view of Itohiya '986 and Ohzawa, renders obvious the subject matter recited by claim 2 of the '313 Patent.

141. A POSITA would have been motivated to further combine Ohzawa with the combined system of Itohiya '759 and Itohiya '986, and would have had a reasonable expectation of success in making the combination. As described above in Section IX.B, there are significant benefits to having the optical axis of the lens groups be at an incline relative to a normal line at a center of a surface of the image display element, and a POSTIA would have been motivated to capitalize on these benefits by applying Ohzawa's teachings. I will now discuss how Itohiya '759, Itohiya '986, and Ohzawa apply to claim 2 of the '313 Patent on an element-by-element basis.

1. Claim 2

[2.0/2.1] The projection type image display apparatus, according

to claim 1, wherein an optical axis of said first and second lens group is inclined to a normal line at a center of a surface of said image display element.

142. The discussion of this limitation in Section IX.B above is incorporated here by reference.

143. Thus, Itohiya '759, in view of Itohiya '986 and Ohzawa, discloses or renders obvious each limitation of claim 2.

E. Karasawa in View of Yamagishi '706 and Itohiya '759 Renders Claim 1 Obvious

144. In my opinion and for the reasons explained below, Karasawa, in view of Yamagishi '706 and Itohiya '759, renders obvious the subject matter recited by claim 1 of the '313 Patent.

145. As a threshold matter, a POSITA would have been motivated to combine the teachings of Karasawa with the teachings of Yamagishi '706 and Itohiya '759—and would have had a reasonable expectation of success in making the combination—for a number of reasons. All three of these references are directed to optical systems that project light from an image generating device onto a screen by way of lenses. *See, e.g.*, EX1009, abstract, [0022]; EX1010, abstract, [0006], [0030]; EX1007, abstract. Accordingly, the references are in the same field of endeavor and POSITAs would naturally have looked to them in their work. Moreover, a POSITA would have understood that the teachings of Karasawa would have been compatible and operable in combination with the teachings of Yamagishi

‘706 and Itohiya ‘759.

146. For example, Karasawa discloses that “[a]ccording to a preferred aspect of the present invention, it is also characterized in that at least some of the lenses constituting the second lens group or the front group are movable along the optical axis.” EX1009, [0019]. Consistent with this disclosure of having at least some lenses be moveable, a POSITA would have recognized that Yamagishi ‘706 describes having certain lenses in a rear projection system be moveable while other lenses in the system are fixed in place. In particular, Yamagishi ‘706 explains that its primary disclosure relates to “a fixed focal length lens-type lens system where no lenses aside from the focusing lenses move.” EX1010, [0064]. In other words, some of the lenses are fixed in place, while other lenses are allowed to move. A POSITA would have been motivated to take advantage of these teachings by combining Yamagishi ‘706’s disclosures with those of Karasawa. *Id*. For example, having only certain lenses (*e.g.*, the focusing lenses) move would have reduced the expense, and improved the reliability, of the system as compared to a system where all of the lenses are allowed to move.

147. Additionally, a POSITA would have recognized that Itohiya ‘759 describes details of how the fixed lenses in a system with both fixed and moveable lenses are firmly supported on the lower part of the optical system’s chassis. EX1007, [0040]-[0041]. A POSITA looking at Karasawa’s and Yamagishi ‘706’s

teachings relating to systems with fixed and moveable lenses would naturally have looked to Itohiya '759 for additional implementation details for such systems.

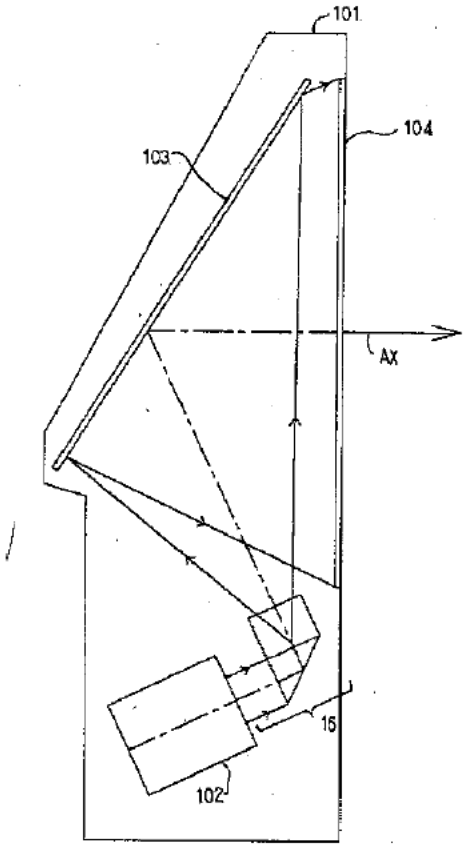
148. Ultimately, a POSITA would have been motivated to combine the teachings of Yamagishi '706 and Itohiya '759 with those of Karasawa and would have recognized that combining these teachings would have produced predictable and operable results. I will now discuss how these prior art references apply to claim 1 of the '313 Patent on an element-by-element basis.

1. Independent Claim 1

[1.0] A projection type image display apparatus, comprising;

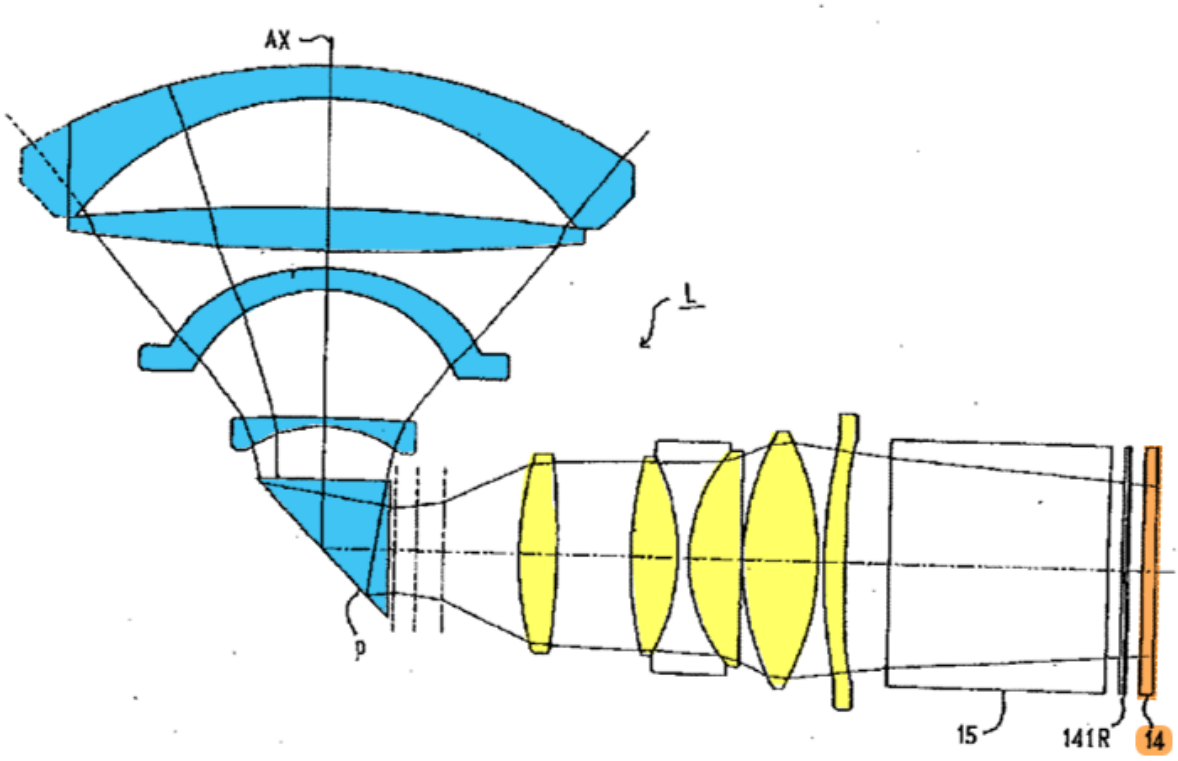
149. Karasawa discloses a projection type image display apparatus. Karasawa explains that "[a]ccording to the second invention, a projector can be provided that includes an lighting optical system that emits illumination light, a light modulation device that modulates illumination light emitted from the lighting optical system in response to an image signal, and a projection lens for projecting an optical image formed in the light modulation device to a predetermined surface." EX1009, [0022]. Karasawa's Fig. 7 is reproduced below:

[FIG. 7]



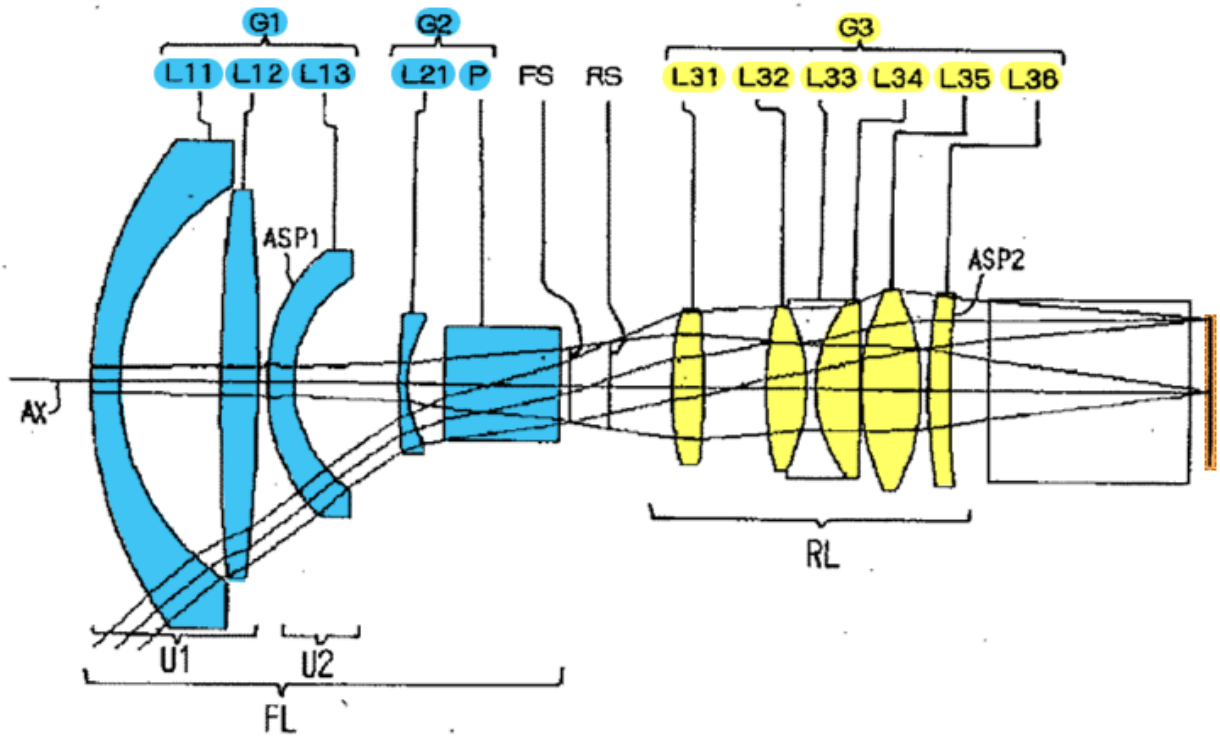
[1.1] an image display element;

150. Karasawa discloses a projection type image display apparatus that includes an image display element. Karasawa teaches that its apparatus includes "a light modulation device that modulates illumination light emitted from the lighting optical system in response to an image signal." *Id.*, [0022]. Further, "FIG. 8 is a diagram illustrating a schematic configuration and optical path from the light modulation device 14R [shown as 14] in the projection light generating section 102 to the projection lens L when red image light is used as a representative example." *Id.*, [0070]. Karasawa's Fig. 8 is annotated below:



[1.2] a first lens group, being disposed in a light direction with respect to said image display element, which is configured to include a plural number of lenses;

151. Karasawa discloses a projection type image display apparatus that includes a first lens group, being disposed in a light direction with respect to said image display element, which is configured to include a plural number of lenses. Karasawa's Fig. 1 is annotated below:



152. Karasawa explains that "FIG. 1 is a diagram illustrating lens configuration of a projection lens according to the first embodiment of the present invention. From the screen side, in order, it is comprised of the first lens group G1 having negative power, the second lens group G2 having negative power, and the third lens group G3 having positive power." *Id.*, [0024]. Moreover, "[t]he three-piece cemented lens cemented lens in the third lens group G3 mainly has the function of correcting chromatic aberration. Also, the meniscus-shaped positive lens L36 with aspheric surface ASP2 compensates for image plane curvature and distortion aberration. This makes possible well-balanced correction of all aberrations. Also, in this embodiment, the first lens group G1 and the second lens group G2 constitute the

front group FL, and the third lens group constitutes the rear group RL." *Id.*, [0035].

153. Karasawa's third lens group G3 or RL corresponds to the "first lens group" of the '313 Patent. In this regard, Karasawa explains that "[t]he aberration correction function is performed by the biconvex-shaped positive lens L31 on the screen side for under-correction, the three piece negative lens for over-correction, and the biconvex-shaped positive lens L35 on the liquid crystal panel side, which is the imaging surface, for under-correction." *Id.*, [0034]. As shown in Fig. 1, this lens group has a plural number of lenses and is disposed in a light direction with respect to the image display element.

[1.3] a second lens group, being disposed in a light direction with respect to said first lens group, which is configured to include a plural number of lenses;

154. Karasawa discloses a projection type image display apparatus that includes a second lens group, being disposed in a light direction with respect to said first lens group, which is configured to include a plural number of lenses.

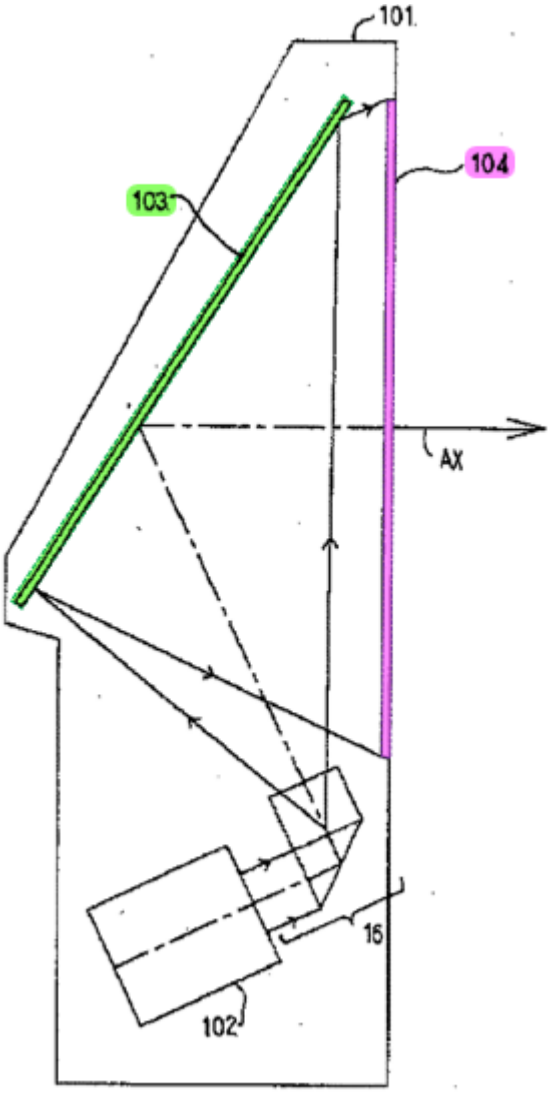
155. Karasawa explains that "the first lens group G1 and the second lens group G2 constitute the front group FL…." *Id.*, [0035]. "First, the first lens group G1 consists of a meniscus-shaped negative lens L11 with a convex surface facing the screen side, a bi-convex-shaped positive lens L12, and a meniscus-shaped negative lens L13 with a convex surface facing the screen side, in order from the screen side. The screen side face of the meniscus-shaped negative lens L13, ASP1,

is an aspheric surface." *Id.*, [0027]. "The second lens group G2 consists of a meniscus-shaped negative lens L21 with a convex surface facing the screen side and prism P for folding the optical path. The meniscus-shaped negative lens L21 is movable along the optical axis AX. The meniscus-shaped negative lens L21, when combined with the first lens group G1, has a stronger negative power at the screen side portion than the front aperture FS. As a result, a long back focus can be obtained in all systems of the projection lens." *Id.*, [0030].

156. Karasawa's front lens group FL corresponds to the "second lens group" of the '313 Patent. As shown in Fig. 1, this lens group has a plural number of lenses and is disposed in a light direction with respect to the first lens group (rear group RL).

[1.4] a reflection mirror, which is configured to reflect lights emitted from at least one of said first and second lens groups, so as to project upon said screen obliquely;

157. Karasawa discloses a projection type image display apparatus that includes a reflection mirror, which is configured to reflect lights emitted from at least one of said first and second lens groups, so as to project upon said screen obliquely. Karasawa's Fig. 7 is annotated below:



158. Karasawa explains that "[l]ight from the projection light generating section 102 enters the reflective mirror 103 as it spreads through the projection optical system 16. Reflective mirror 103 then reflects the projection light to the screen section 104 side." *Id.*, [0069]. As shown in Fig. 7, light is reflected from the reflective mirror 103 such that it projects onto screen section 104 obliquely.[2]

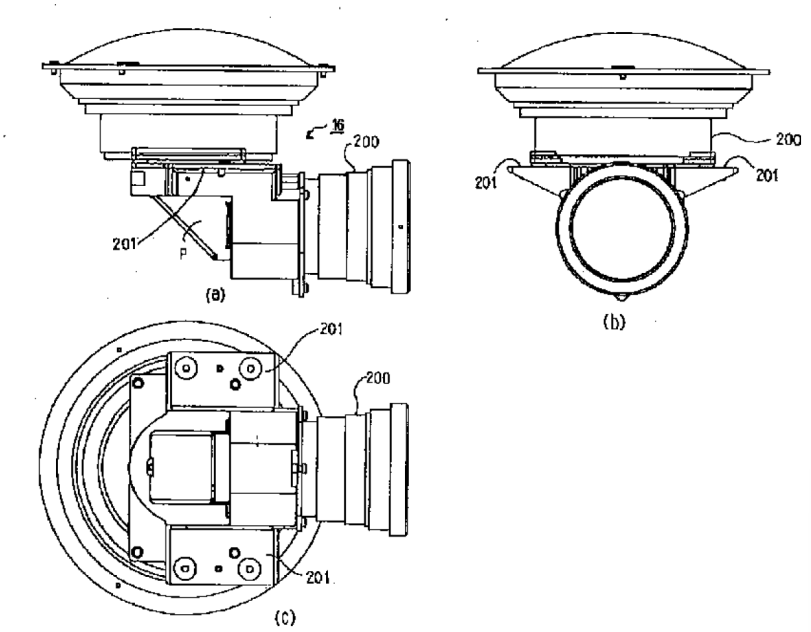
[2] In addition, Karasawa discloses that its light modulation device can be, for example, a reflective liquid crystal panel. *Id.*, [0095]. It would have been obvious to a POSITA to tilt such a reflective liquid crystal panel relative to an optical axis. *See, e.g.*,

[1.5] a first mounting base, on which said first lens group is mounted;

159. Karasawa discloses a projection type image display apparatus that includes a first mounting base, on which said first lens group is mounted. Karasawa teaches that "[n]ext, the mounting portion of projection optical system 16 is described. FIGS. 10(a), (b), (c) are diagrams showing the state in which the projection lens L according to the first through third embodiments described above is held in the lens barrel 200. Lens barrel 200 has a fixing flange 201 in the vicinity of prism P. The fixing flange 201 has a hole in which the screws 202 (FIG. 11) engage. FIG. 11(a) is an upper perspective view of a configuration securing the projection optical system 16 and the optical engine section 203. In addition, FIG. 11(b) is a downward perspective view of a configuration securing the projection optical system 16 and the optical engine section 203. Here, the optical engine section 203 includes light modulation devices 14R, 14G, 14B, and color synthesis optical system 15." *Id.*, [0089]. Karasawa's Figs. 10(a), (b), and (c) are reproduced below:

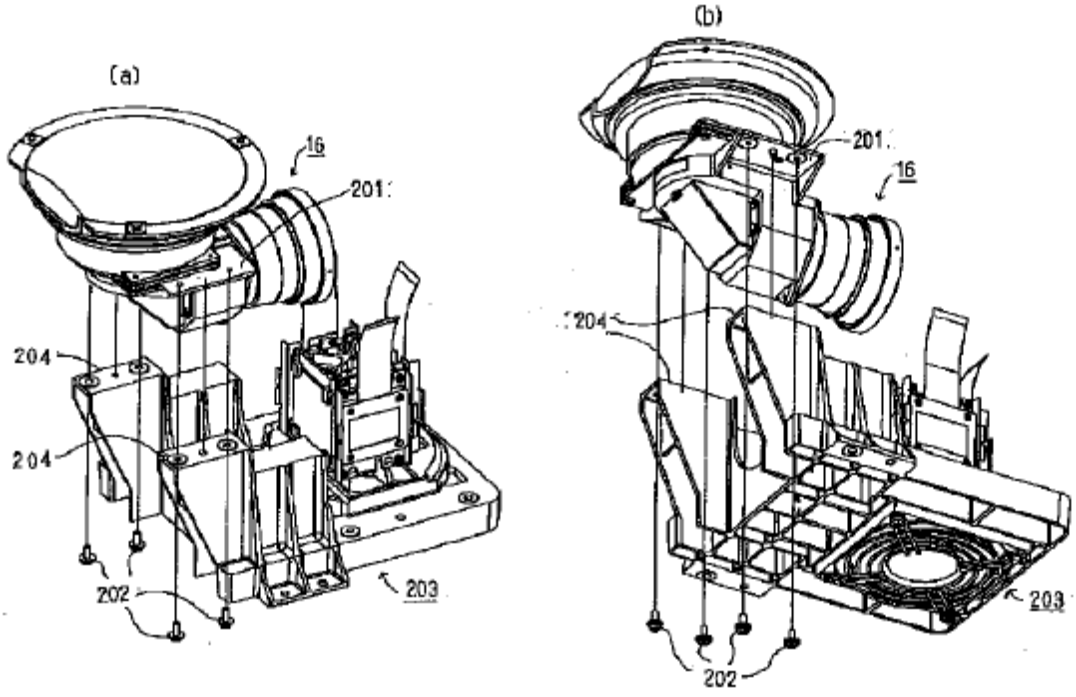
EX1008; Section VIII.D, *supra*; EX1012. As noted above in footnote 1, a POSITA would have further known that, for compensating the trapezoidal distortion or focusing caused by a tilted image display element, it would have been beneficial to also tilt the screen on which the image is ultimately projected. *See* EX1012, [0014]. In other words, the central ray (and other rays) of a projected image from the tilted image display element would also contact the screen at an oblique angle.

[FIG. 10]



160. Karasawa's Figs. 11(a) and (b) are reproduced below:

[FIG. 11]



161. The projection optical system 16 includes the first and second lens

groups described above in connection with limitations [1.2] and [1.3]. *Id.*, [0068], [0086]. Accordingly, Karasawa's lens barrel 200 corresponds to a mounting base on which both the first and second lens groups are mounted. Karasawa's optical engine section 203 can also be considered a mounting base.

[1.6] a second mounting base, on which said second lens group is mounted; and

162. Karasawa discloses a projection type image display apparatus that includes a mounting base, on which said second lens group is mounted. As discussed in connection with limitation [1.5], Karasawa's lens barrel 200 corresponds to a mounting base on which both the first and second lens groups are mounted. Karasawa's optical engine section 203 can also be considered a mounting base.

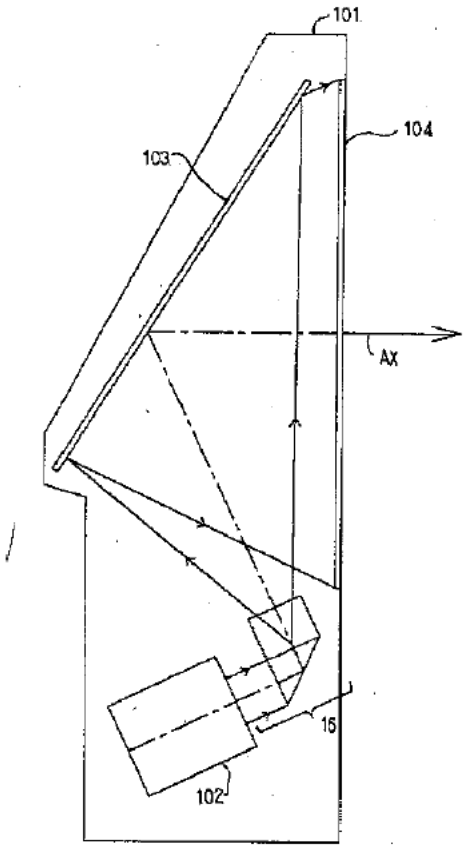
163. Karasawa may not expressly disclose a "second" mounting base on which the second lens group is mounted, distinct from the first mounting base. However, Yamagishi '706 discloses this concept. *Id.* For example, Yamagishi '706 teaches that "[t]he present invention has been described based on a fixed focal length lens-type lens system where no lenses aside from the focusing lenses move…." EX1010, [0064]. In other words, Yamagishi '706's group of focusing lenses move, while its other lenses are fixed in place. Karasawa also discloses that "at least some of the lenses constituting the second lens group or the front group are movable along the optical axis." EX1009, [0019]. Accordingly, a POSITA would have understood that Yamagishi '706 discloses distinct mounting bases for its moveable and fixed

lens groups, and would have been motivated to combine Yamagishi '706's disclosure in this regard with Karasawa to obtain the benefits of having both moveable and fixed lenses in the system.

[1.7] a chassis, which is configured to store said first and second lens group, said reflection mirror, and said first and second mounting bases;

164. Karasawa discloses a projection type display apparatus that includes a chassis, which is configured to store said first and second lens group, said reflection mirror, and said first and second mounting bases. Karasawa's Fig. 7 is reproduced below:

[FIG. 7]



165. Karasawa describes how "[r]ear projectors also have a configuration

that mounts a transparent-type screen in the front of a cabinet and houses all optical components in the cabinet." EX1009, [0003]. Further, "FIG. 7 is a diagram illustrating a schematic of an internal configuration of a rear projector according to the fourth embodiment. The rear projector 101 according to this embodiment includes projection lenses according to the first through third embodiments described above." *Id.*, [0067].

[1.8] wherein said first mounting base is fixed at a bottom of said chassis, while said second mounting base is moveable.

166. Karasawa discloses that "[a]ccording to a preferred aspect of the present invention, it is also characterized in that at least some of the lenses constituting the second lens group or the front group are movable along the optical axis." EX1009, [0019]. In this regard, Karasawa further teaches that "[a]lso, the first unit U1 is configured with a meniscus-shaped negative lens L11 of the first lens group G1 and a biconvex-shaped positive lens L12. Further, the second unit U2 is configured with a meniscus-shaped negative lens L13. Thus, the first unit U1 is movable along the optical axis AX." *Id.*, [0028]. Additionally, "[t]he second lens group G2 consists of a meniscus-shaped negative lens L21 with a convex surface facing the screen side and prism P for folding the optical path. The meniscus-shaped negative lens L21 is movable along the optical axis AX." *Id.*, [0030].

167. Karasawa may not expressly disclose separate mounting bases for its two lens groups where the first mounting base is fixed at a bottom of the chassis

while the second mounting base is moveable. However, Yamagishi '706 discloses this concept. For example, Yamagishi '706 teaches that "[t]he present invention has been described based on a fixed focal length lens-type lens system where no lenses aside from the focusing lenses move…." EX1010, [0064]. In other words, Yamagishi '706's group of focusing lenses move, while its other lenses are fixed in place. While Yamagishi '706 may not disclose the details of how its first mounting base is fixed at a bottom of a chassis, a POSITA would look to Itohiya '759 for such additional details.

168. In this regard, Itohiya '759 discloses that "[t]he rear-group optical system 132 is disposed forward of the image display element 120. *The rear-group optical system 132 is supported within a lens barrel 142 which can be formed by aluminum die-casting or of an engineering plastic (e.g., polycarbonate, PPS, etc). Referring to FIG. 2, it is particularly preferred that the barrel 142 for the rear-group optical system is firmly supported on the lower cabinet 112 using any fastening means such as screw fastening*." EX1007, [0041] (emphasis added).

169. Accordingly, the combination of Karasawa, Yamagishi '706, and Itohiya '759 discloses a projection type display apparatus wherein the first mounting base is fixed at a bottom of the chassis, while the second mounting base is moveable.

170. Thus, Karasawa, in view of Yamagishi '706 and Itohiya '759, discloses or renders obvious each limitation of claim 1.

F. Karasawa in View of Yamagishi '706, Itohiya '759, and Ohzawa Renders Claim 2 Obvious

171. In my opinion and for the reasons explained below, Karasawa, in view of Yamagishi '706, Itohiya '759, and Ohzawa renders obvious the subject matter recited by claim 2 of the '313 Patent.[3]

172. As a threshold matter, a POSITA would have been motivated to further combine Ohzawa with the combined system of Karasawa, Yamagishi '706, and Itohiya '759, and would have had a reasonable expectation of success in making the combination. As described above in Section IX.B, there are significant benefits to having the optical axis of the lens groups be at an incline relative to a normal line at a center of a surface of the image display element, and a POSTIA would have been motivated to capitalize on these benefits by applying Ohzawa's teachings. I will now discuss how Karasawa, Yamagishi '706, Itohiya '759, and Ohzawa apply to claim 2 of the '313 Patent on an element-by-element basis.

1. Claim 2

[2.0/2.1] The projection type image display apparatus, according to claim 1, wherein an optical axis of said first and second lens group is inclined to a normal line at a center of a surface of said image display element.

173. The discussion of this limitation in Section IX.B above is incorporated here by reference.

[3] *See* footnote 2, *supra*, in relation to limitation [1.4].

174. Thus, Karasawa, in view of Yamagishi '706, Itohiya '759, and Ohzawa discloses or renders obvious each limitation of claim 2.

G. Karasawa in View of Yamagishi '706, Itohiya '759, and Itohiya '986 Renders Claim 3 Obvious

175. In my opinion and for the reasons explained below, Karasawa, in view of Yamagishi '706, Itohiya '759, and Itohiya '986, renders obvious the subject matter recited by claim 3 of the '313 Patent. As a threshold matter, a POSITA would have been motivated to further combine Itohiya '986 with the combined system of Karasawa, Yamagishi '706, and Itohiya '759, and would have had a reasonable expectation of success in making the combination. Karasawa discloses moveable lenses, Yamagishi '706 discloses the concept of having one lens group moveable and another lens group fixed, and Itohiya '759 discloses the mechanical details of how a first mounting base for one of the lens groups is fixed at a bottom of the chassis. *See supra*. However, these references lack an express disclosure of a mechanism for manipulating the moveable group of lenses. A POSITA would naturally have looked to Itohiya '986's detailed disclosure of an adjustment fixing screw (rod member) as a mechanism to make the second mounting base moveable. I will now discuss how Karasawa, Yamagishi '706, Itohiya '759, and Itohiya '986 apply to claim 3 of the '313 Patent on an element-by-element basis.

1. Claim 3

[3.0/3.1] The projection type image display apparatus, according

to claim 1, further comprising: a rod member, which makes said second mounting base movable.

176. Karasawa, Yamagishi '706, and Itohiya '759 do not expressly disclose a rod member that makes a second mounting base moveable. However, Itohiya '986 discloses such a rod member that makes a second mounting base moveable, and it would have been obvious to combine Itohiya '986's disclosure in this regard with Karasawa, Yamagishi '706, and Itohiya '759. Itohiya '986's Figs. 1 and 2 are reproduced below:

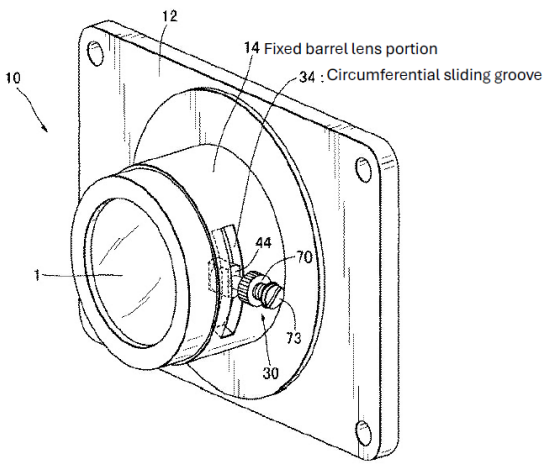


FIG. 1

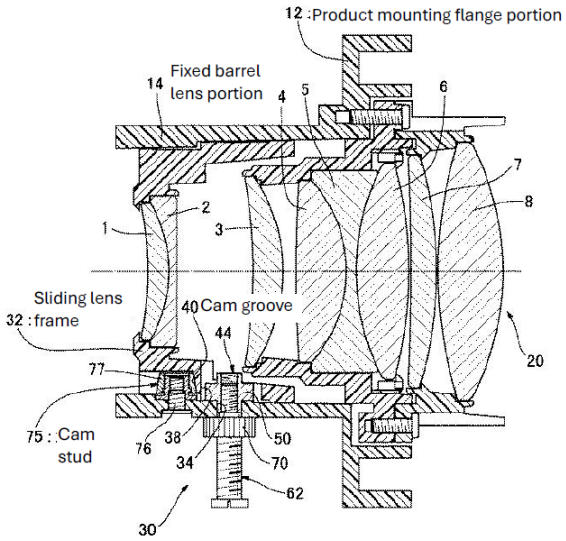


FIG. 2

177. Itohiya '986 discloses that "[f]irst, as shown in Figures 1 and 2, [the device] is assembled so that the three cam studs 75 are respectively cam-engaged in each of the cam grooves 40 on sliding lens frame 32. At the same time, *adjustment fixing screw 62* is screwed into threaded hole 64 on sliding stud 44, wherein columnar part 50 is slidably engaged with straight sliding groove 38. In this state, cam groove 40 is guided by cam stud 75 through the rotation of adjustment fixing

screw 62 around the optical axis. I.e., *when adjustment fixing screw 62 is rotated around the optical axis, columnar part 50 moves within straight sliding groove 38. As a result, lenses 1 and 2, supported by sliding lens frame 32, move along the optical axis, adjusting the position of the lenses 1 and 2*." EX1006, [0029] (emphasis added).

178. Thus, Karasawa, in view of Yamagishi '706, Itohiya '759, and Itohiya '986, discloses or renders obvious each limitation of claim 3.

X. Secondary Considerations

179. I am not aware of any secondary considerations that would make claims 1-3 of the '313 Patent nonobvious over the prior art considered herein. Regardless, any possible secondary considerations would not overcome the above-cited prior art, which clearly demonstrates that the subject matter of claims 1-3 of the '313 Patent would have been obvious to a POSITA as of June 15, 2006.

I hereby declare that statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true. Should further information become available to me as this matter proceeds, I may revise my opinions accordingly as necessary. I declare under penalty of perjury that the foregoing Declaration is true and correct. Executed on January 16, 2025.

By: