United States Patent and Trademark Office
Before the Patent Trial and Appeal Board

LG ELECTRONICS, INC. AND LG ELECTRONICS U.S.A., INC.,
Petitioner

V.

TOSHIBA SAMSUNG STORAGE TECHNOLOGY KOREA CORPORATION,
Patent Owner

Case IPR2015-01653
Patent RE43,106

Petitioner's Demonstrative Exhibits for October 6, 2016 Oral Argument

Instituted Ground

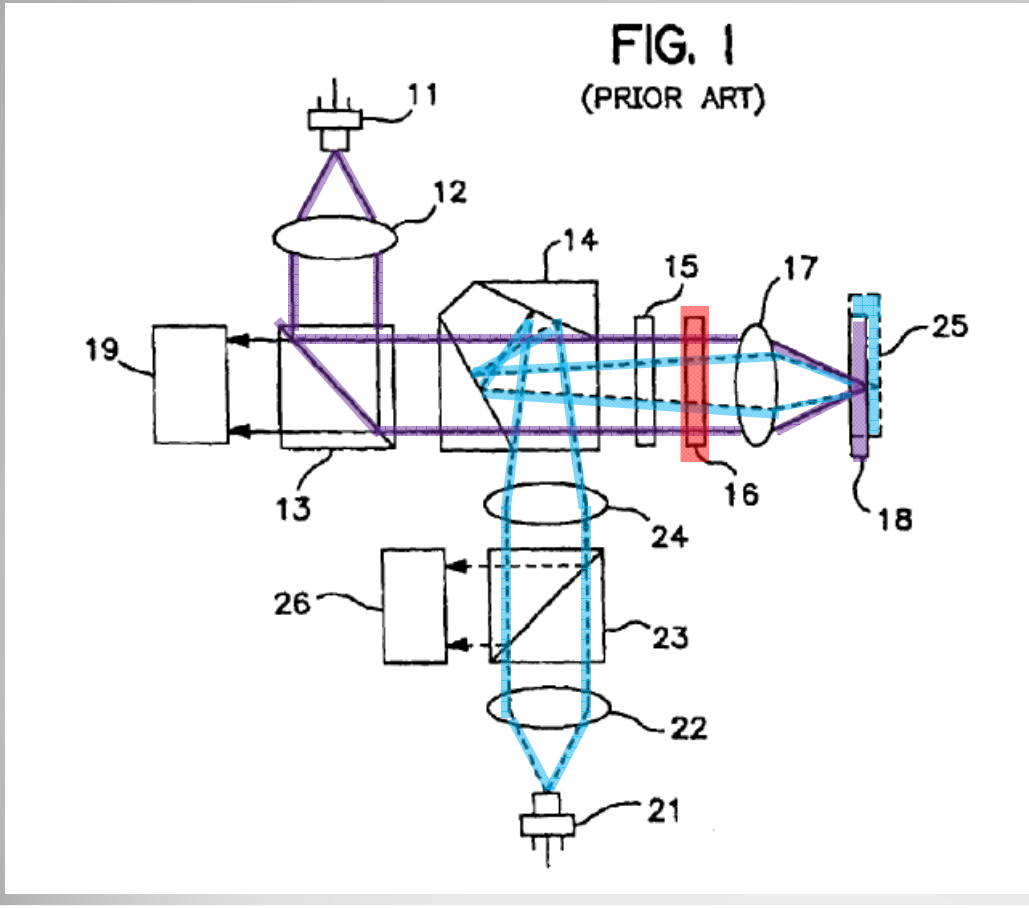
III. ORDER

Accordingly, it is

ORDERED that pursuant to 35 U.S.C. § 314 and 37 C.F.R. § 42.4, an *inter partes* review hereby is instituted as to the proposed ground of obviousness of claims 7–19 over APA and Katayama;

Background (Admitted Prior Art) of the '106 patent

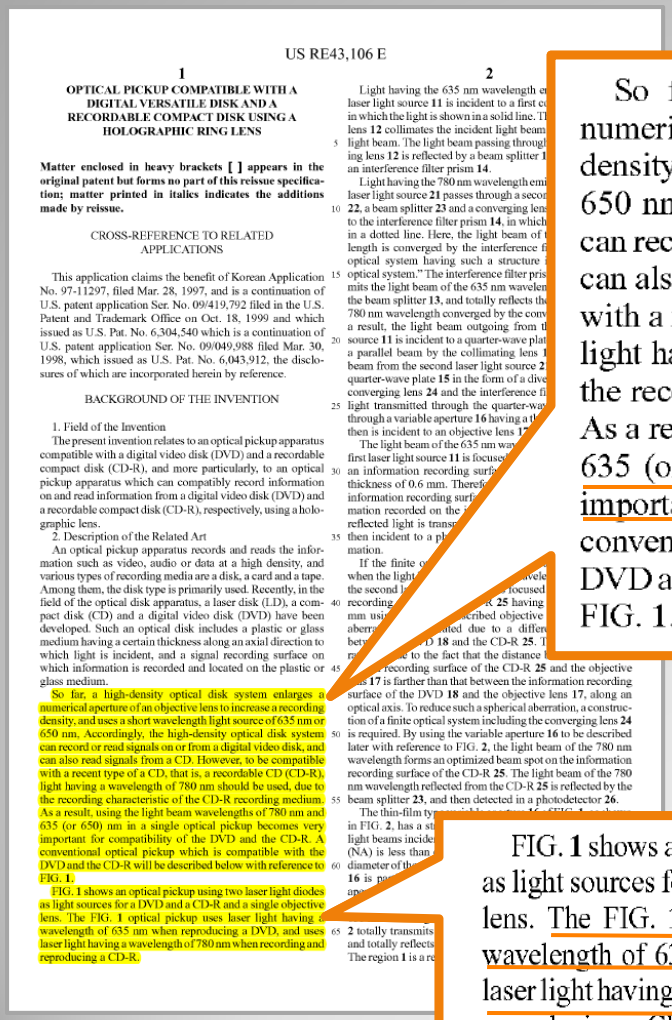
Conventional Optical Pickup Apparatus



11, 21 – laser light source
12, 22 – collimating lens
13, 23 – beam splitter
14 – interference filter prism
15 – quarter-wave plate
16 – variable aperture
17 – objective lens
18 – DVD
24 – converging lens
25 – CD - R
26 – photodetector

(Ex. 1001 at 1:62-2:50)

Conventional Optical Pickup Apparatus



US RE43,106 E

1

OPTICAL PICKUP COMPATIBLE WITH A DIGITAL VERSATILE DISK AND A RECORDABLE COMPACT DISK USING A HOLOGRAPHIC RING LENS

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of Korean Application No. 97-11297, filed Mar. 28, 1997, and is a continuation of U.S. patent application Ser. No. 09/419,792 filed in the U.S. Patent and Trademark Office on Oct. 18, 1999 and which issued as U.S. Pat. No. 6,304,540 which is a continuation of U.S. patent application Ser. No. 09/049,988 filed Mar. 30, 1998, which issued as U.S. Pat. No. 6,043,912, the disclosures of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an optical pickup apparatus compatible with a digital video disk (DVD) and a recordable compact disk (CD-R), and more particularly, to an optical pickup apparatus which can compatibly record information on and read information from a digital video disk (DVD) and a recordable compact disk (CD-R), respectively, using a holographic lens.

2. Description of the Related Art

An optical pickup apparatus records and reads the information such as video, audio or data at a high density, and various types of recording media are a disk, a card and a tape. Among them, the disk type is primarily used. Recently, in the field of the optical disk apparatus, a laser disk (LD), a compact disk (CD) and a digital video disk (DVD) have been developed. Such an optical disk includes a plastic or glass medium having a certain thickness along an axial direction to which light is incident, and a signal recording surface on which information is recorded and located on the plastic or glass medium.

So far, a high-density optical disk system enlarges a numerical aperture of an objective lens to increase a recording density, and uses a short wavelength light source of 635 nm or 650 nm, Accordingly, the high-density optical disk system can record or read signals on or from a digital video disk, and can also read signals from a CD. However, to be compatible with a recent type of a CD, that is, a recordable CD (CD-R), light having a wavelength of 780 nm should be used, due to the recording characteristic of the CD-R recording medium. As a result, using the light beam wavelengths of 780 nm and 635 (or 650) nm in a single optical pickup becomes very important for compatibility of the DVD and the CD-R. A conventional optical pickup which is compatible with the DVD and the CD-R will be described below with reference to FIG. 1.

FIG. 1 shows an optical pickup using two laser light diodes as light sources for a DVD and a CD-R and a single objective lens. The FIG. 1 optical pickup uses laser light having a wavelength of 635 nm when reproducing a DVD, and uses laser light having a wavelength of 780 nm when recording and reproducing a CD-R.

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Light having the 635 nm wavelength e... laser light source **11** is incident to a first c... in which the light is shown in a solid line. T... lens **12** collimates the incident light beam... light beam. The light beam passing through... ing lens **12** is reflected by a beam splitter **1**... an interference filter prism **14**.

Light having the 780 nm wavelength emi... laser light source **21** passes through a secon... **22**, a beam splitter **23** and a converging lens... to the interference filter prism **14**, in which... in a dotted line. Here, the light beam of t... length is converged by the interference fi... optical system having such a structure ... optical system." The interference filter pris... mits the light beam of the 635 nm wavelen... the beam splitter **13**, and totally reflects th... 780 nm wavelength converged by the conv... a result, the light beam outgoing from t... source **11** is incident to a quarter-wave plat... a parallel beam by the collimating lens **1**... beam from the second laser light source **2**... quarter-wave plate **15** in the form of a dive... converging lens **24** and the interference fi... light transmitted through the quarter-wa... through a variable aperture **16** having a t... then is incident to an objective lens **17**...

The light beam of the 635 nm wa... first laser light source **11** is focuse... an information recording surfa... thickness of 0.6 mm. Therefo... information recording surfa... mation recorded on the ... reflected light is transf... then incident to a pl... mation.

If the finite c... when the light ... the second l... focused ... recording ... **25** having ... mm usi... scribed objective ... aberr... ated due to a differ... bet... **18** and the CD-R **25**. T... re... e to the fact that the distance ... recording surface of the CD-R **25** and the objective ... **17** is farther than that between the information recording surface of the DVD **18** and the objective lens **17**, along an optical axis. To reduce such a spherical aberration, a construction of a finite optical system including the converging lens **24** is required. By using the variable aperture **16** to be described later with reference to FIG. **2**, the light beam of the 780 nm wavelength forms an optimized beam spot on the information recording surface of the CD-R **25**. The light beam of the 780 nm wavelength reflected from the CD-R **25** is reflected by the beam splitter **23**, and then detected in a photodetector **26**.

The thin-film ty... ... in FIG. **2**, has a st... light beams incide... (NA) is less than ... diameter of th... **16** is p... ap...

2 totally transmits ... and totally reflects ... The region **1** is a re...

So far, a high-density optical disk system enlarges a numerical aperture of an objective lens to increase a recording density, and uses a short wavelength light source of 635 nm or 650 nm, Accordingly, the high-density optical disk system can record or read signals on or from a digital video disk, and can also read signals from a CD. However, to be compatible with a recent type of a CD, that is, a recordable CD (CD-R), light having a wavelength of 780 nm should be used, due to the recording characteristic of the CD-R recording medium. As a result, using the light beam wavelengths of 780 nm and 635 (or 650) nm in a single optical pickup becomes very important for compatibility of the DVD and the CD-R. A conventional optical pickup which is compatible with the DVD and the CD-R will be described below with reference to FIG. 1.

(Ex. 1001 at 1:47-61, emphasis added)

FIG. 1 shows an optical pickup using two laser light diodes as light sources for a DVD and a CD-R and a single objective lens. The FIG. 1 optical pickup uses laser light having a wavelength of 635 nm when reproducing a DVD, and uses laser light having a wavelength of 780 nm when recording and reproducing a CD-R.

(*See also* Petition at 4-5)

(Ex. 1001 at 1:62-67, emphasis added)

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