(12) **United States Patent**
Suzuki et al.

(10) **Patent No.:** US 9,316,495 B2
(45) **Date of Patent:** Apr. 19, 2016

(54) **DISTANCE MEASUREMENT APPARATUS**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 308 days.

(21) Appl. No.: **13/962,196**

(22) Filed: **Aug. 8, 2013**

(65) **Prior Publication Data**

US 2014/0071428 A1 Mar. 13, 2014

(30) **Foreign Application Priority Data**

Sep. 13, 2012 (JP) 2012-201054

(51) **Int. Cl.**
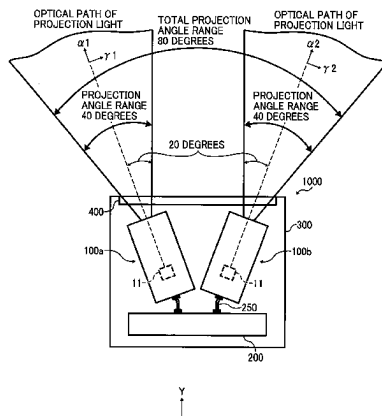|	
G01C 3/08	(2006.01)
G01S 17/00	(2006.01)
G01S 7/484	(2006.01)
G01S 7/486	(2006.01)

(52) **U.S. Cl.**
CPC . *G01C 3/08* (2013.01); *G01S 7/484* (2013.01); *G01S 7/4863* (2013.01); *G01S 17/00* (2013.01)

(58) **Field of Classification Search**
CPC G01S 17/02; G01S 17/10; G01S 7/4811
USPC 356/3.01–5.15
See application file for complete search history.

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(57) **ABSTRACT**

A distance measurement apparatus that measures distance to a target by irradiating the target with laser beams and detecting light reflected by the target includes a light projection unit. The distance measurement apparatus also includes a plurality of light emission units to emit a plurality of laser beams onto the target while setting optical paths of the plurality of laser beams radially along a given virtual plane; and a light receiving unit including a plurality of light receivers to receive the plurality of laser beams projected from the light projection unit and reflected by the target.

16 Claims, 16 Drawing Sheets

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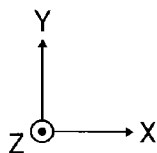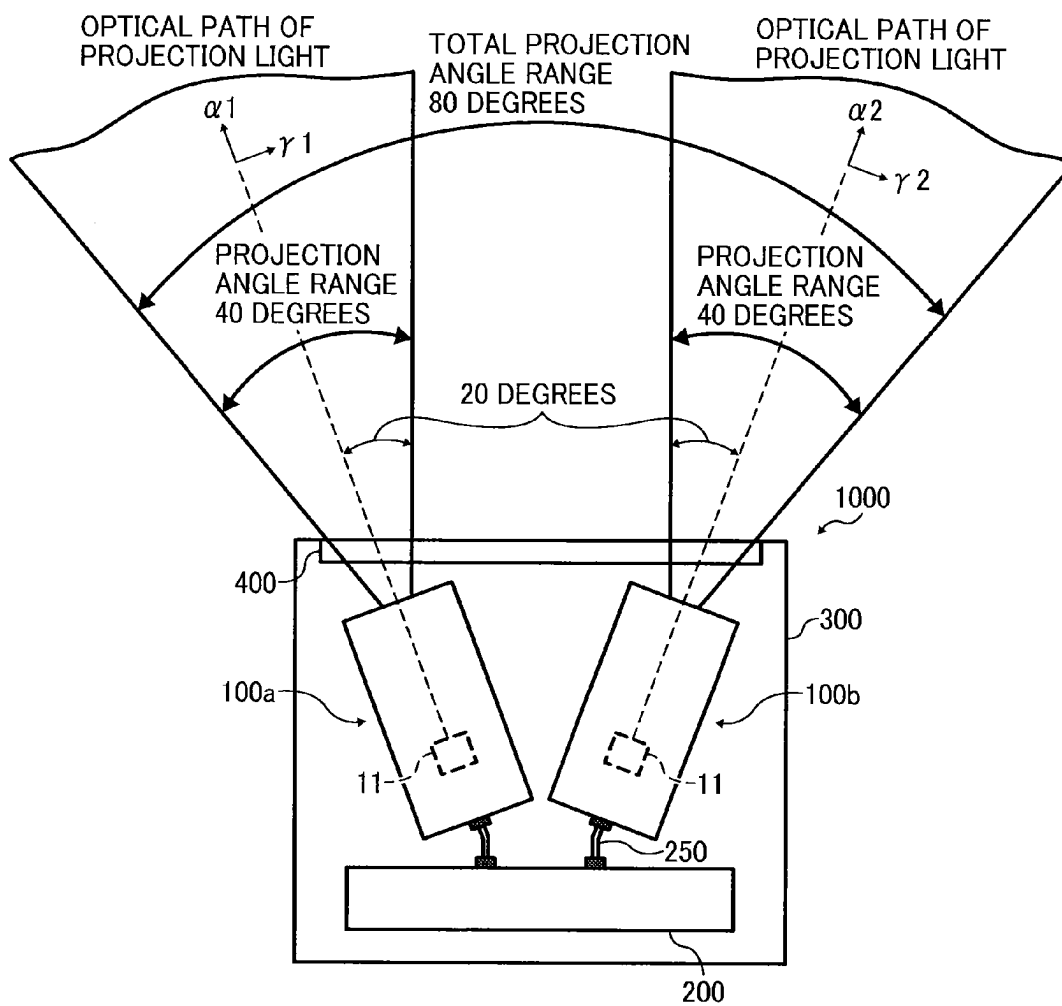
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FIG. 1

OPTICAL PATH OF
PROJECTION LIGHT

TOTAL PROJECTION
ANGLE RANGE
80 DEGREES

OPTICAL PATH OF
PROJECTION LIGHT

$\alpha 1$

$\gamma 1$

$\alpha 2$

$\gamma 2$

PROJECTION
ANGLE RANGE
40 DEGREES

PROJECTION
ANGLE RANGE
40 DEGREES

20 DEGREES

1000

400

300

100a

100b

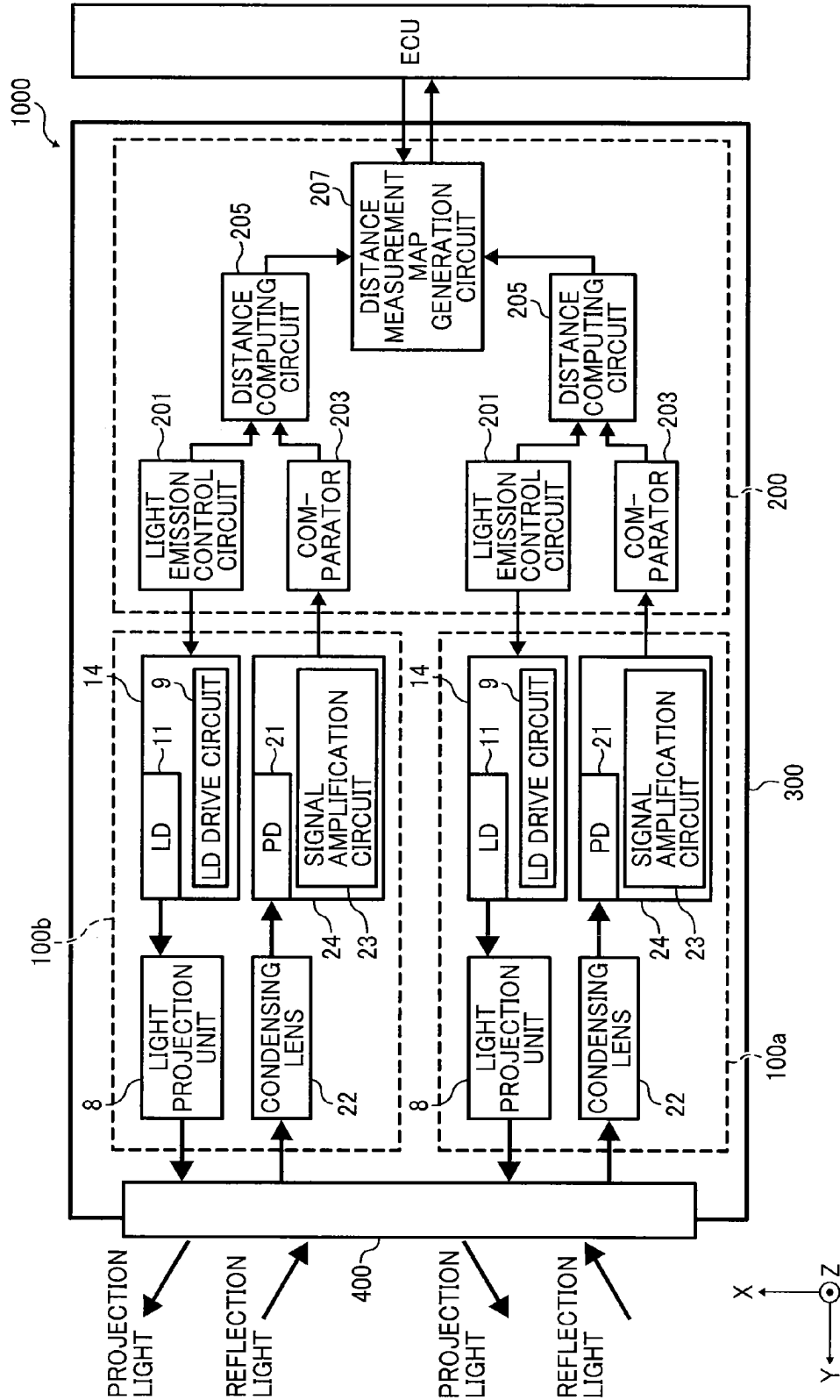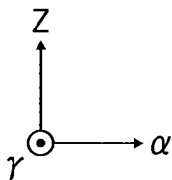11

11

250

200

Y

Z

X

FIG. 2

FIG. 3

DOCKET ALARM
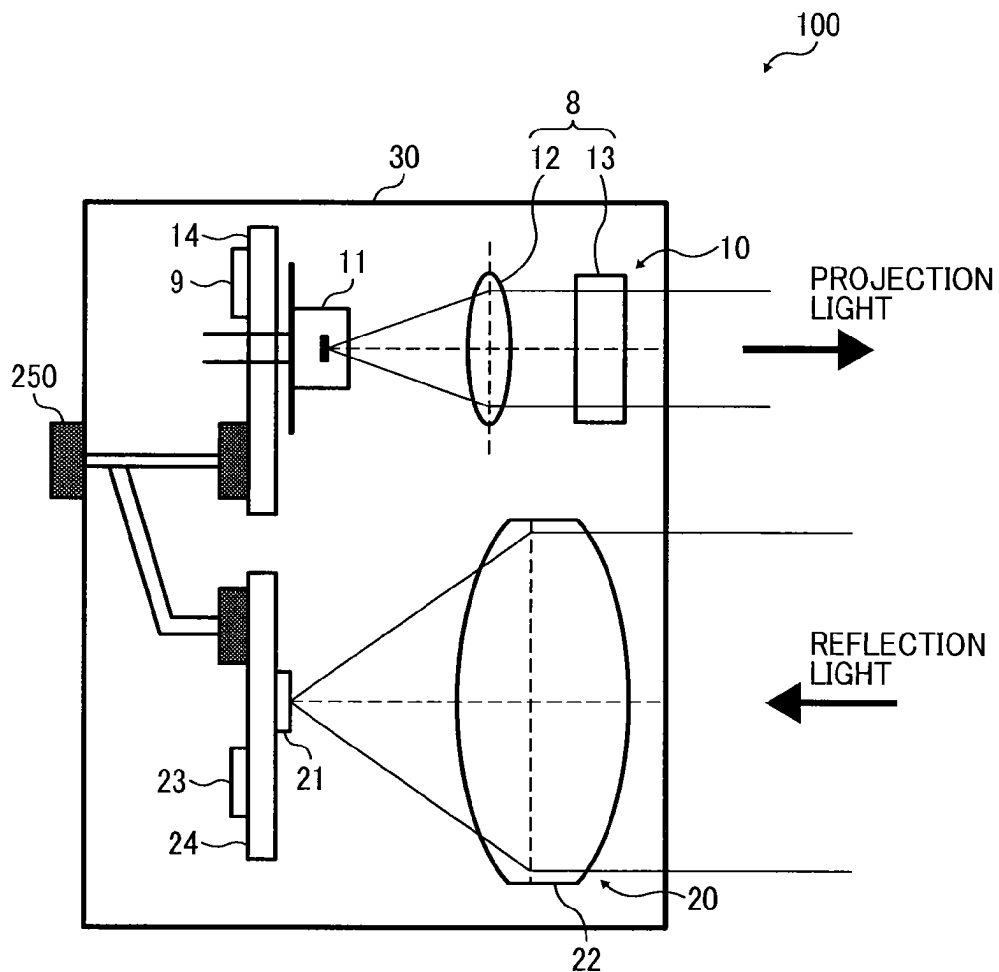
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