



[54] EXPOSURE APPARATUS HAVING CATADIOPTRIC PROJECTION OPTICAL SYSTEM

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[73] Assignee: Nikon Corporation, Japan

[*] Notice: The term of this patent shall not extend beyond the expiration date of Pat. No. 5,636,066.

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[30] Foreign Application Priority Data

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[51] Int. Cl.⁶ G02B 3/00

[52] U.S. Cl. 359/651; 355/53; 359/631

[58] Field of Search 359/631, 649, 359/650, 651, 726, 727; 355/53

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[57] ABSTRACT

To use a beam splitting optical system smaller than the conventional beam splitters and to set a longer optical path between a concave, reflective mirror and an image plane. A light beam from an object surface travels through a first converging group to enter a beam splitter, and a light beam reflected by the beam splitter is reflected by a concave, reflective mirror to form an image of patterns on the object surface inside the concave, reflective mirror. A light beam from the image of the patterns passes through the beam splitter and thereafter forms an image of the patterns through a third converging group on an image plane.

25 Claims, 13 Drawing Sheets

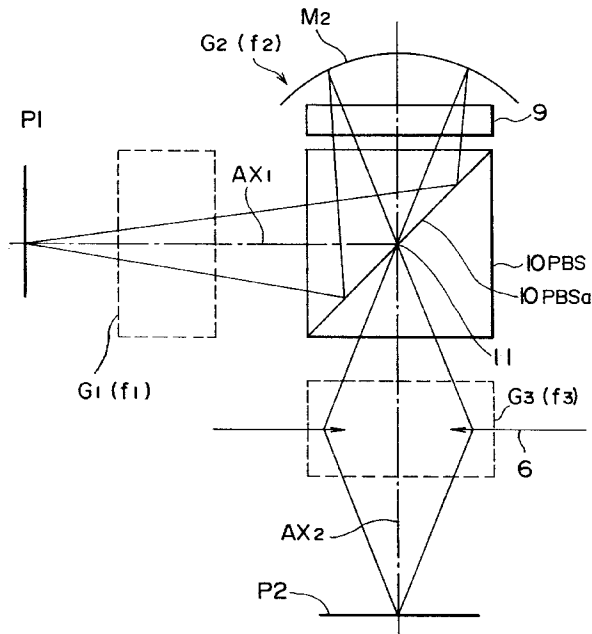


Fig. 1

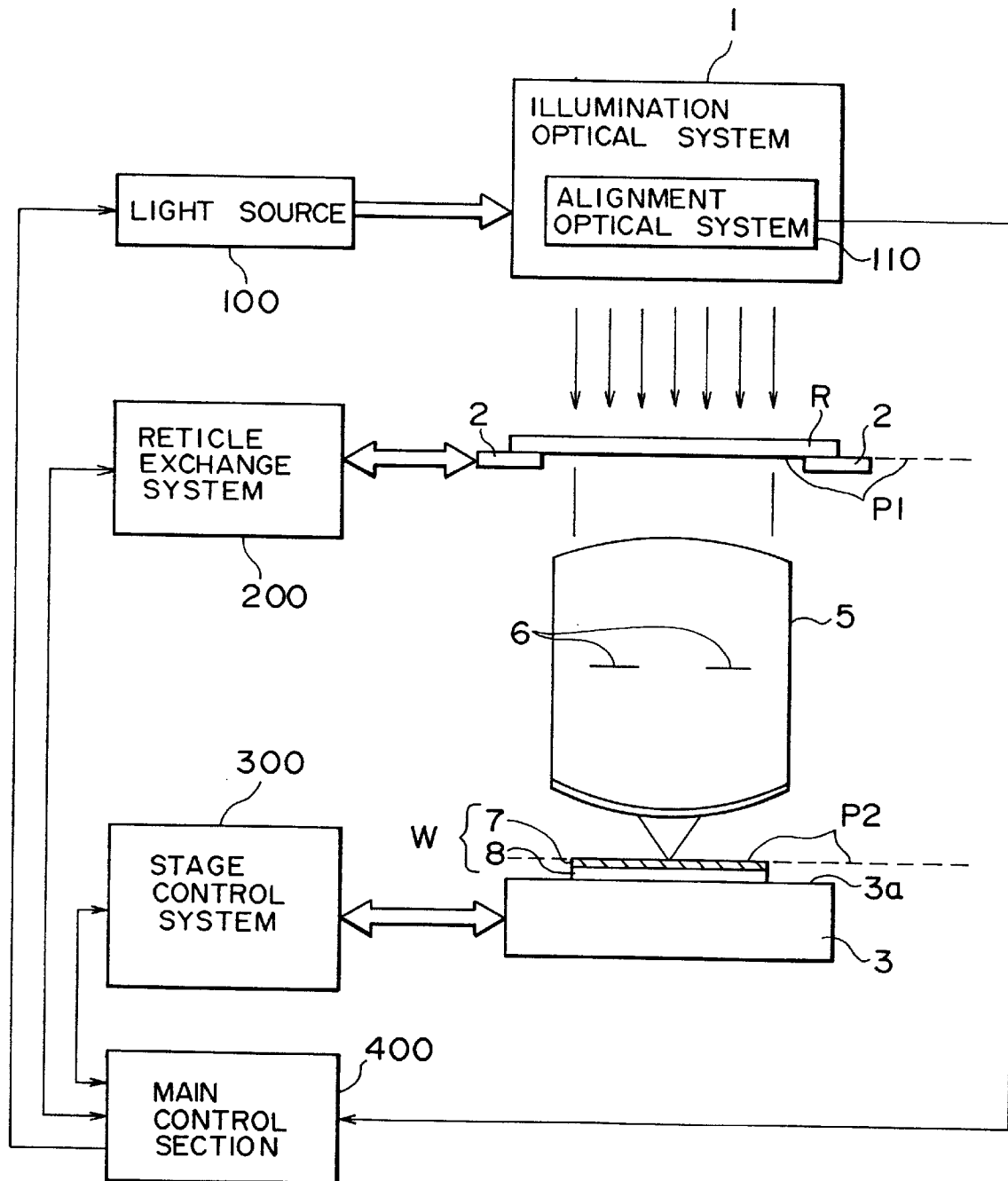


Fig. 2

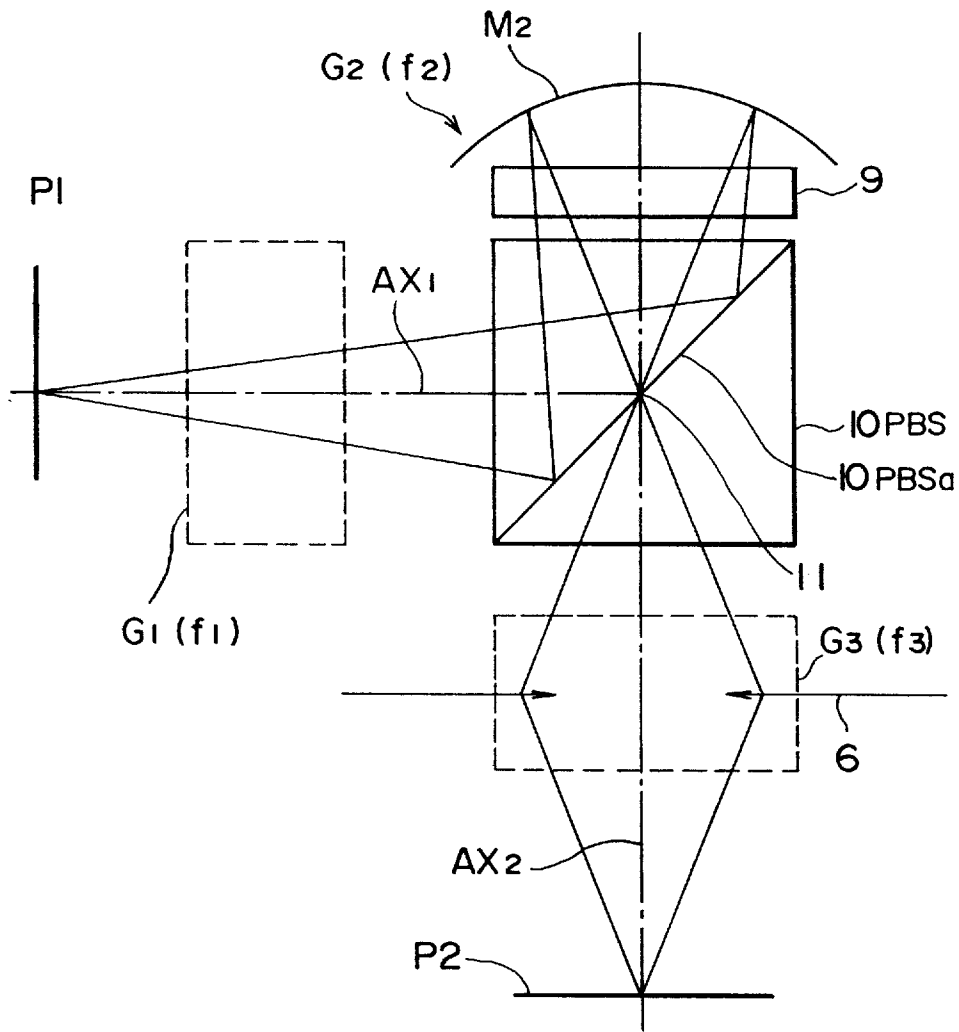


Fig. 3

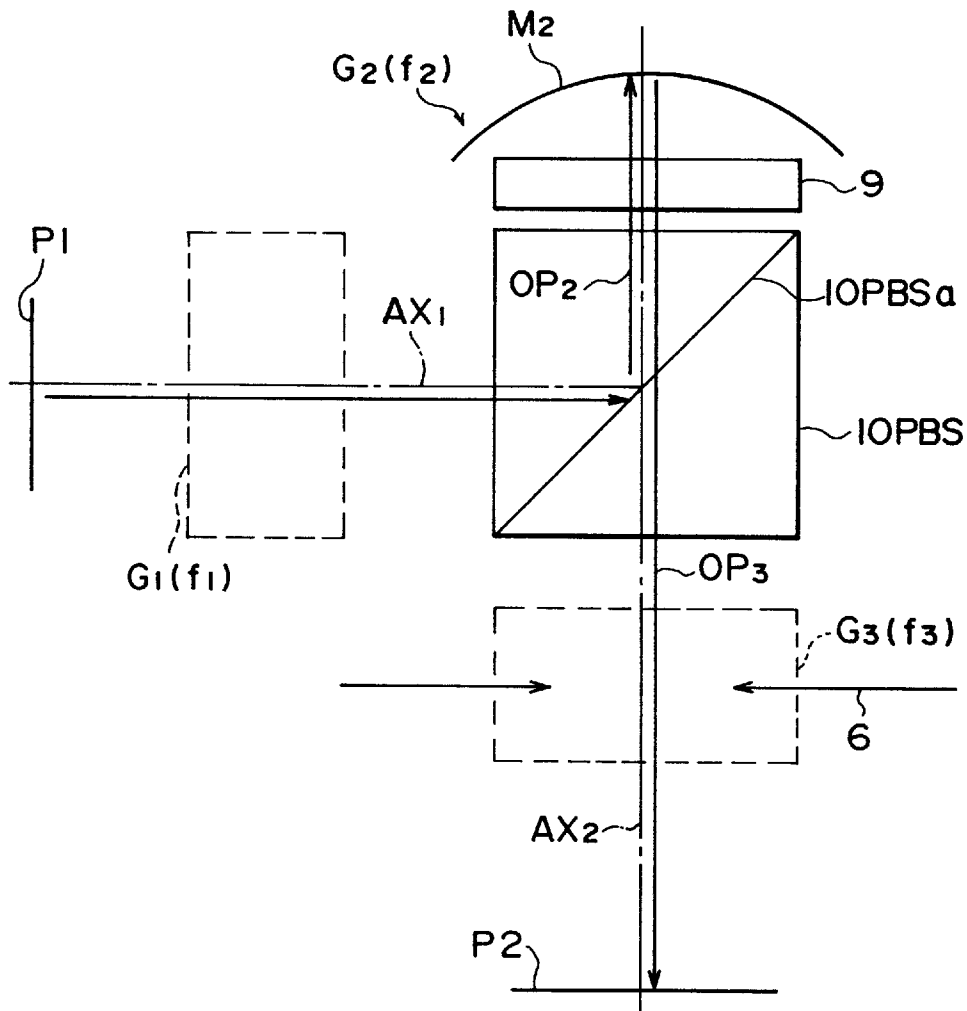
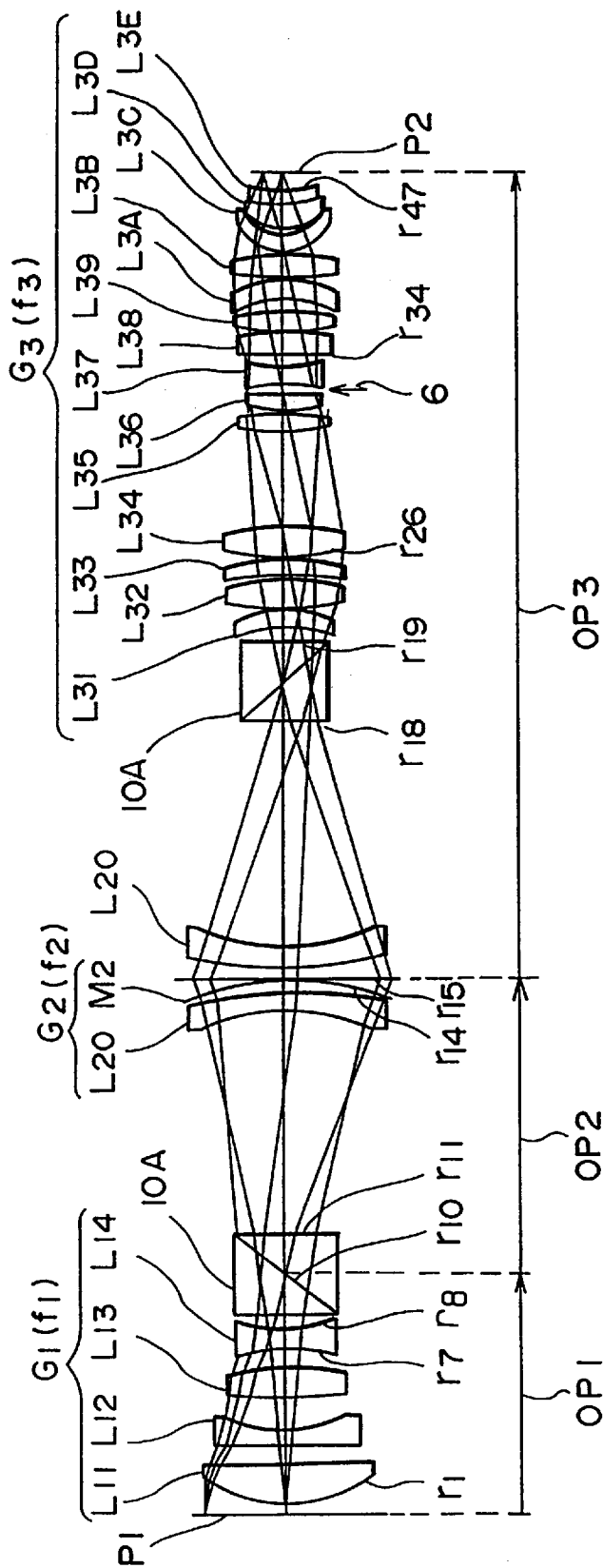


Fig. 4



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