

## United States Patent

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Title: **Method for Making a Holographic Linear Position Encoder**

Abstract:

A method for fabricating an error-free linear position encoder incorporates the generation of fringes on a holographic plate by the interference of light from two point sources. The fringes are projected onto a curved holographic plate without intervening optical elements, the curve being such that the fringes have a constant pitch along the surface of the plate. A methodology for generating such a curve includes the creation of a graphic representation of the hyperbolic fringes generated by the interference between two coherent point sources, which would fall on an appropriately curved holographic plate. A numerical technique derived from the graphic representation produces a "constant-pitch" curve such that all of the fringes projected onto the curve are equidistant. The holographic plate, coated with a photosensitive material, is fabricated or formed in the shape of the constant-pitch curve. After the plate is exposed to the interference fringe pattern, the plate is processed to produce a corresponding amplitude or phase structure on the plate. The plate is then flattened and used either as a precise linear encoder, or as a master from which precise linear encoders may be replicated.