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Marron

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(54) **COHERENT LADAR USING INTRA-PIXEL QUADRATURE DETECTION**

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(52) **U.S. Cl.**

CPC ***G01S 7/4863*** (2013.01); ***G01S 7/4865*** (2013.01); ***G01S 7/4914*** (2013.01); ***G01S 7/4917*** (2013.01); ***G01S 13/89*** (2013.01)

(58) **Field of Classification Search**

CPC G02B 27/58; G02B 26/10; G01J 1/20

See application file for complete search history.

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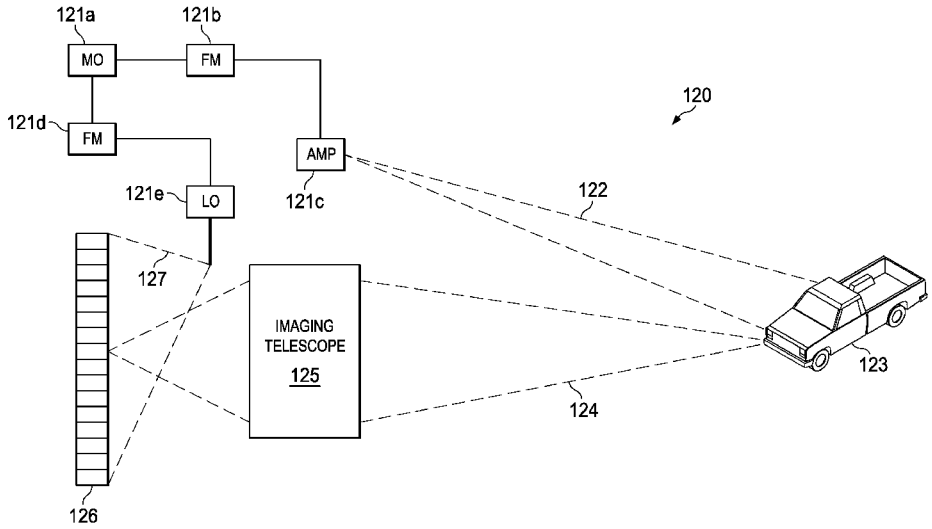
(57) **ABSTRACT**

A frequency modulated (coherent) laser detection and ranging system includes a read-out integrated circuit formed with a two-dimensional array of detector elements each including a photosensitive region receiving both return light reflected from a target and light from a local oscillator, and local processing circuitry sampling the output of the photosensitive region four times during each sample period clock cycle to obtain quadrature components. A data bus coupled to one or more outputs of each of the detector elements receives the quadrature components from each of the detector elements for each sample period and serializes the received quadrature components. A processor coupled to the data bus receives the serialized quadrature components and determines an amplitude and a phase for at least one interfering frequency corresponding to interference between the return light and the local oscillator light using the quadrature components.

20 Claims, 6 Drawing Sheets