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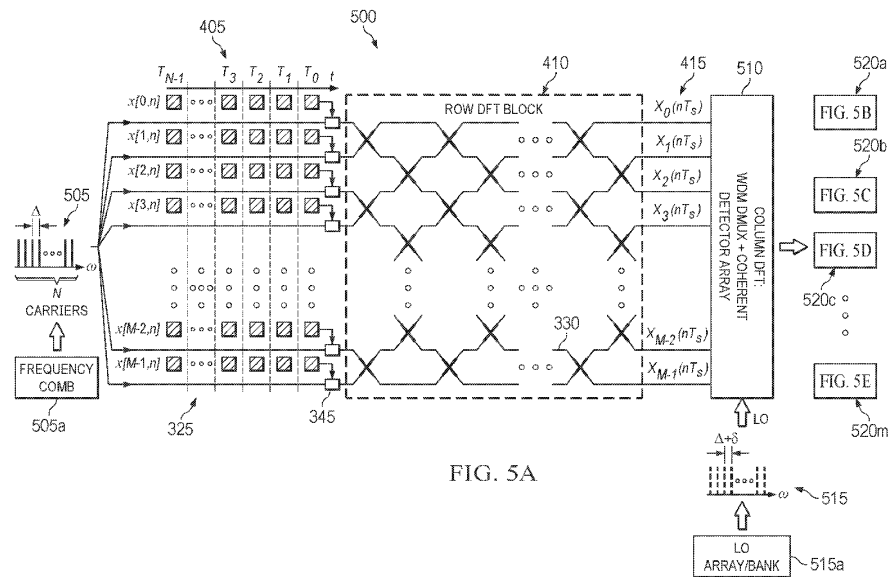


FIG. 5A

(57) **Abstract:** An apparatus includes a frequency comb (505a) configured to generate first carrier signals (505) having at least one first frequency spacing. The apparatus also includes multiple modulators (345) each configured to modulate an amplitude of one of the first carrier signals and generate a modulated carrier signal. The apparatus further includes a two-dimensional array of optical couplers (330) configured to perform one-dimensional discrete Fourier transforms in a first direction using the modulated carrier signals. The apparatus also includes an array of coherent detectors (625a-625n) and first demultiplexers (605) optically coupled to outputs of the array of optical couplers and to the coherent detectors. The apparatus further includes a local oscillator (LO) bank or array (515a) configured to generate second carrier signals (515) having at least one second frequency spacing different from the at least one first frequency spacing. In addition, the apparatus includes second demultiplexers (615) optically coupled to outputs of the LO bank or array

[Continued on next page]

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and to the coherent detectors.