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(54) **Title:** CASCADED, SELF-CALIBRATED, SINGLE-PIXEL INFRARED HADAMARD TRANSFORM SPECTROMETER

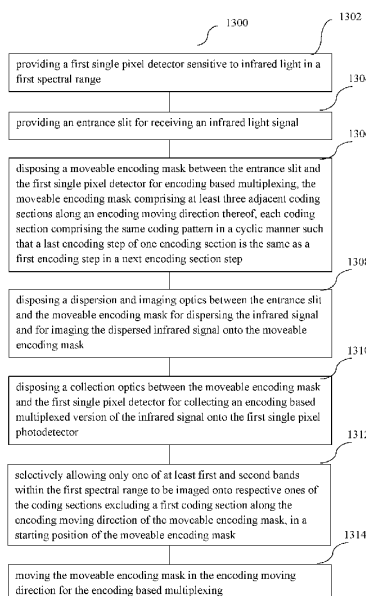


Figure 13

(57) **Abstract:** Infrared spectrometer and method of performing infrared spectrometry. In one embodiment, the method comprises the steps of providing a first single pixel detector sensitive to infrared light in a first spectral range; providing an entrance slit for receiving an infrared light signal; disposing a moveable encoding mask between the entrance slit and the first single pixel detector for encoding based multiplexing, the moveable encoding mask comprising at least three adjacent coding sections along an encoding moving direction thereof, each coding section comprising the same coding pattern in a cyclic manner such that a last encoding step of one encoding section is the same as a first encoding step in a next encoding section step; disposing a dispersion and imaging optics between the entrance slit and the moveable encoding mask for dispersing the infrared signal and for imaging the dispersed infrared signal onto the moveable encoding mask; disposing a collection optics between the moveable encoding mask and the first single pixel detector for collecting an encoding based multiplexed version of the infrared signal onto the first single pixel photodetector; selectively allowing only one of at least first and second bands within the first spectral range to be imaged onto respective ones of the coding sections excluding a first coding section along the encoding moving direction of the moveable encoding mask, in a starting position of the moveable encoding mask; and moving the moveable encoding mask in the encoding moving direction for the encoding based multiplexing.

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