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(54) **Title:** METHODS, SYSTEMS AND APPARATUSES FOR EQUIPMENT ALIGNMENT AND POSITION TEACH

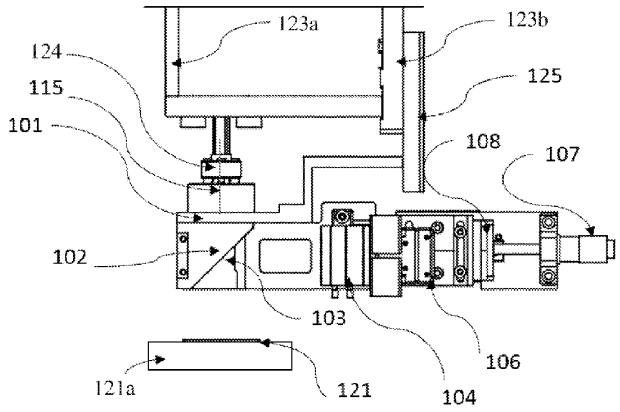

FIG. 2C

(57) **Abstract:** Methods, systems and apparatuses for equipment alignment and position teach are provided. According to another aspect of the present embodiments, a system for pick-and-place calibration of a pick-and-place machine is provided. The system comprises a universal teach apparatus, a computing means, and a motor control means. The universal teach apparatus is configured to teach pick-and-place positions and is coupleable to a pick head of the pick-and-place machine. The universal teach apparatus includes imaging means for capturing images in-line with a center of the pick head. The computing means is coupled to the universal teach apparatus to receive the captured images and is configured to generate at least one virtual image corresponding to one or more parameters of the captured images. And the motor control means is coupled to the computing means, the pick head of the pick-and-place machine, and the universal teach apparatus and is configured to move the pick head under control of the computing means and/or the universal teach apparatus. During a process of teaching pick-and- place positions, the computing means is configured to adjust a pick head position via the motor control means based on alignment of the center of the pick head with the at least one virtual image and is further configured to record a plurality of coordinate parameters corresponding to position data of the motor control means when the center of the pick head fully and accurately aligns with the at least one virtual image.

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