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(54) **MOTOR HAVING INTEGRATED ACTUATOR WITH ABSOLUTE ENCODER AND METHODS OF USE**

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(57) **ABSTRACT**

A DC electric motor having a stator mounted to a substrate, the stator having a coil assembly having a magnetic core, a rotor mounted to the stator with a first set of permanent magnets distributed radially about the rotor to facilitate rotation of the rotor and a second set of permanent magnets on the rotor to facilitate determination of an absolute position of the rotor. The motor further includes first and second set of sensors for detection of the magnets of the inner and outer rings. During operation of the motor passage of the permanent magnets over the sensors produces a substantially sinusoidal signal of varying voltage substantially without noise and/or saturation, allowing an absolute position of the rotor relative the substrate to be determined from the sinusoidal signals without requiring use of an encoder or position sensors and without requiring noise-reduction or filtering of the signal.