Claims:

1. A high torque, low inertia direct drive motor having mounted with an encoder or a resolver, comprising a circular outer stator 21 and a circular inner stator 25 and a plurality of magnets 23a, 23b, 23c, and forming a circular ring of magnets 23a, 23b, 23c,

the ring of magnets 23a, 23b, 23c is held by a support structure 31, said ring of magnets 23a, 23b, 23c positioned between the circular outer stator 21 and the circular inner stator 25 with an air gap between the magnets 23a, 23b, and 23c and the circular outer stator 21 and an air gap between the magnets 23a, 23b, 23c and the circular inner stator 25;

the circular outer stator 21 having a plurality of teeth 46a, 46b, 46c;

the circular inner stator 25 having a plurality of teeth 44a, 44b, 44c;

coils are wound around the teeth of the circular inner stator 26a, 26b, 26c and the circular outer stator 22a, 22b, 22c;

wherein the plurality of teeth of the circular inner stator 44a, 44b, 44c are aligned in the same radial direction as the plurality of teeth of the circular outer stator 46a, 46b, 46c~~.~~, and the circular outer stator 46a, 46b, 46c, and the encoder to provide position feedback for servo control, wherein the encoder sensor is mounted onto a motor housing inside the support structure 31 such that a cable of the sensor goes through an inner hole of the motor through a base of the motor; and wherein the motor is a combination of the slot/pole at 18 slots with 24 poles.

2. ~~A~~The high torque, low inertia direct drive motor having mounted with an encoder as claimed in Claim 1 wherein the support structure 31 is assembled with a bearing to a motor housing.

3. ~~A~~The high torque, low inertia direct drive motor having mounted with an encoder as claimed in Claim 1 wherein the air gap between the ring of magnets 23a, 23b, 23c and the circular outer stator 21 and the air gap between the ring of magnets 23a, 23b, 23c and the circular inner stator 25 are of the same height.

~~4. The support structure 31 as claimed in Claim 1 which is made from low density non magnetic material.~~

~~5. The support structure 31 as claimed in Claim 1 which is made from aluminum.~~

~~6. The support structure 31as claimed in Claim 1 which is made from fiber reinforced plastic.~~

~~7~~4. The high torque, low inertia direct drive motor having mounted with an encoder ~~support structure 31~~as claimed in Claim 1, wherein the support structure 31 ~~which~~ is made from material selected from aluminum, reinforced plastic, and resin material.

~~8~~5. The high torque, low inertia direct drive motor having mounted with an encoder ~~support structure 31~~ as claimed in Claim ~~1~~4 wherein pockets are machined for mounting of magnets 23a, 23b, 23c.

~~9. A high torque, low inertia direct drive motor as claimed in Claim 1 having a feedback device mounted in the motor, such as an encoder or a resolver to provide position feedback for servo control.~~

~~10. A high torque, low inertia direct drive motor as claimed in Claim 1 having a combination of the slot/pole at 18 slots with 24 poles.~~

~~11~~6. ~~A~~The high torque, low inertia direct drive motor as claimed in Claim 1 having a combination of the slot/pole at 18 slots with 16 poles.

~~12~~7. ~~A~~The high torque, low inertia direct drive motor as claimed in Claim 1 having a combination of the slot/pole at 21 slots with 16 poles.

~~13~~8. A high torque, low inertia direct drive motor ~~as claimed in Claim 1~~ having mounted with an encoder or a resolver, comprising a circular outer stator 21, and a circular inner stator 25 and a plurality of magnets 23a, 23b, 23c, and forming a circular ring of magnets 23a, 23b and 23c,

the ring of magnets 23a, 23b, 23c is held by a support structure 31, said ring of magnets 23a, 23b, 23c positioned between the circular outer stator 21 and a circular inner stator 25 with an

air gap between the magnets 23a, 23b and 23c and the circular outer stator 21 and the air gap between the magnets 23a, 23b, 23c and the circular inner stator 25;

the circular outer stator 21 having a plurality of teeth 46a, 46b, 46c;

the circular inner stator 25 having a plurality of teeth 44a, 44b, 44c;

coils are wound around the teeth of the circular inner stator 26a, 26b, 26c and the circular outer stator 22a, 22b, 22c,

wherein the plurality of teeth of the circular inner stator 44a, 44b, 44c are aligned in the same radial direction as the plurality of teeth of the circular outer stator 46a, 46b, 46c, and the circular outer stator 46a, 46b, 46c, and the encoder to provide position feedback for servo control, wherein the encoder sensor is mounted onto a motor housing inside the support structure 31 such that a cable of the sensor goes through an inner hole of the motor through a base of the motor, and wherein the motor is a combination of the slot/pole at 27 slots with 24 poles.

~~14~~9. ~~A~~The high torque, low inertia direct drive motor as claimed in Claim 1 or Claim 13 having any other combination of number of slots/poles that work with three phase brushless commutation.

~~15~~10. ~~A~~The high torque, low inertia direct drive motor having mounted with an encoder or a resolver high torque as claimed in Claim 1 wherein the encoder sensor or read head 63 is mounted onto a motor housing 64 inside the support structure 31, such that a cable of the sensor or read head 63 can go through an inner hole of the motor, through a base of the motor.

~~16~~11. ~~A~~The high torque, low inertia direct drive motor having mounted with an encoder or a resolver high torque as claimed in Claim 1 wherein the rotor 57 is mounted to the inner ring of the bearing 53 while keeping the outer ring stationary.

~~17~~12. ~~A~~The high torque, low inertia direct drive motor having mounted with an encoder as claimed in Claim 1 wherein the rotor 57 is mounted to the outer ring of the bearing 53 while keeping the inner ring stationary.