

HALF -WAVE, BRUSHLESS, FOUR-PHASE DC MOTOR
WITH BIFILAR WINDINGS

ABSTRACT OF THE DISCLOSURE

A half-wave brushless, four-phase DC motor includes sets of four stator windings fed at 90° phase increments by four switches. The 0° and 180° windings are wound about their magnetic stator poles in bifilar conductor pairs, and the 90° and 270° windings are similarly wound. The bifilar windings are connected to generate the same directions of magnetic fields as the prior-art windings. As a result of the bifilar windings, the magnetic fields of the windings tend to be identical, and all the inductances of each winding tend to be transformer-coupled to the other winding of the bifilar pair. During sequential turn-off of the switches in normal operation, the coupled inductance causes a voltage kick which is poled so it can be damped, and the energy returned to the source, by a diode coupled across the other switch of the bifilar pair. Thus, a half-wave brushless DC motor keeps its advantage of low parts count and simplicity, while gaining the advantages of a full-wave motor in efficiency and voltage spike reduction.

FIGURE 3 a