right hand is pointed in the direction of the magnetic field and the second finger in the direction of current flow, the thumb indicates the direction the current carrying wire moves. The amount of torque developed in a coil depends upon several factors: the strength of the magnetic field, the number of turns in the coil, and the position of the coil in the field. Magnets are made of special steel that produces a strong field. Since there is torque acting on each turn, the greater the number of turns on the coil, the greater the torque. In a coil carrying a steady current located in a uniform magnetic field, the torque varies at successive positions of rotation. *[Figure 12-295]* When the plane of the coil is parallel to the lines of force, the torque is zero. When its plane cuts the lines of force at right angles, the torque is 100 percent. At intermediate positions, the torque ranges between 0 and 100 percent.

Basic DC Motor

A coil of wire through which the current flows rotates when placed in a magnetic field. This is the technical basis governing the construction of a DC motor. *[Figure 12-296]* However, if the connecting wires from the battery were permanently fastened to the terminals of the coil and there was a flow of current, the coil would rotate only until it lined itself up with the magnetic field. Then, it would stop, because the torque at that point would be 0.

A motor, of course, must continue rotating. It is therefore necessary to design a device that reverses the current in the coil just at the time the coil becomes parallel to the lines of force. This creates torque again and causes the coil to rotate. If the current reversing device is set up to reverse the current each time the coil is about to stop, the coil can be made to continue rotating as long as desired.

One method of doing this is to connect the circuit so that, as the coil rotates, each contact slides off the terminal to which it connects and slides onto the terminal of opposite polarity. In other words, the coil contacts switch terminals continuously as the coil rotates, preserving the torque and keeping the coil rotating. In *Figure 12-296*, the coil terminal segments

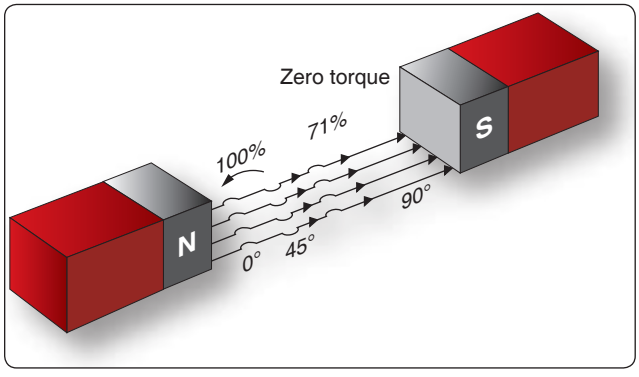

Figure 12-295. *Torque on a coil at various angles of rotation.*

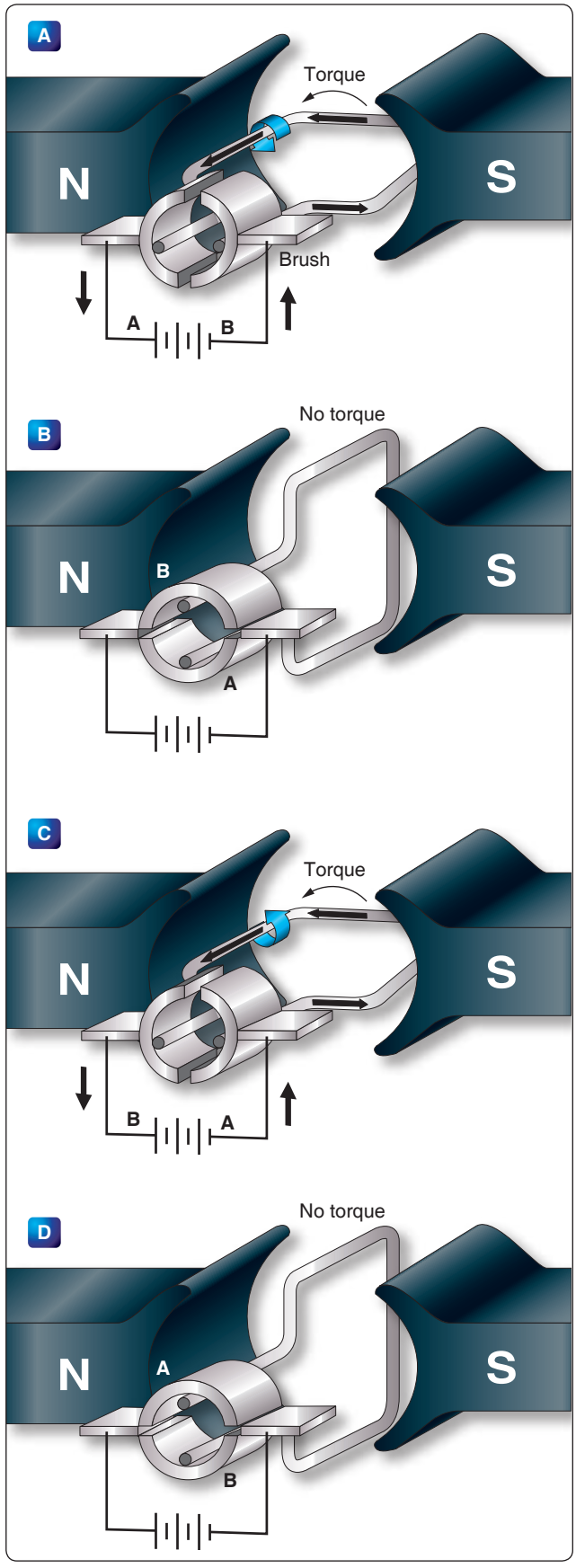

Figure 12-296. *Basic DC motor operation.*