If current flow through the wire were reversed in direction, the two fields would add at the top and subtract at the bottom. Since a wire is always pushed away from the strong field, the wire would be pushed down.

Force Between Parallel Conductors

Two wires carrying current in the vicinity of one another exert a force on each other because of their magnetic fields. An end view of two conductors is shown in *Figure 12-292*. In *Figure 12-292A*, electron flow in both conductors is toward the reader, and the magnetic fields are clockwise around the conductors. Between the wires, the fields cancel because the directions of the two fields oppose each other. The wires are forced in the direction of the weaker field, toward each other. This force is one of attraction. In *Figure 12-292B*, the electron flow in the two wires is in opposite directions.

The magnetic fields are, therefore, clockwise in one and counterclockwise in the other, as shown. The fields reinforce each other between the wires, and the wires are forced in the direction of the weaker field, away from each other. This force is one of repulsion.

To summarize: conductors carrying current in the same direction tend to be drawn together; conductors carrying current in opposite directions tend to be repelled from each other.

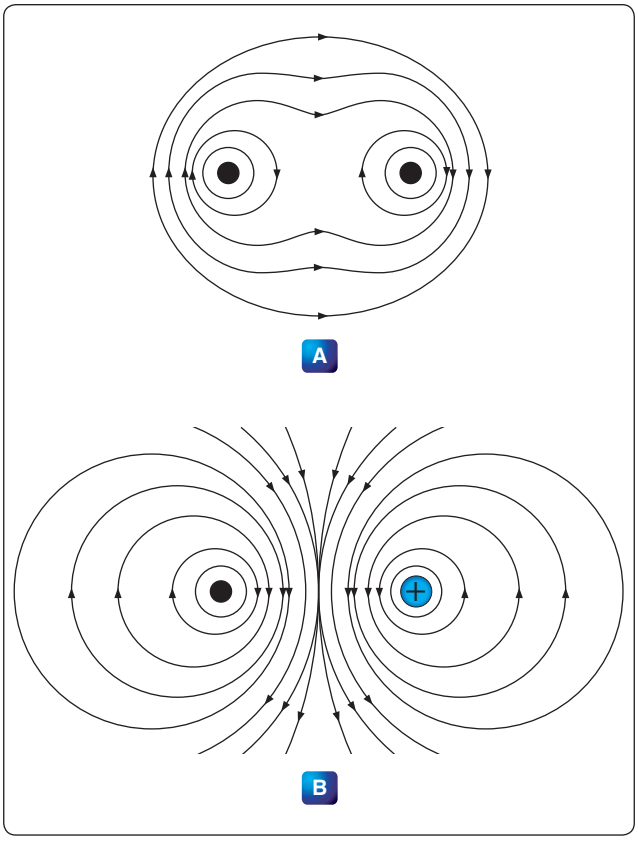

Figure 12-292. *Fields surrounding parallel conductors.*

Developing Torque

If a coil in which current is flowing is placed in a magnetic field, a force is produced which causes the coil to rotate. In the coil shown in *Figure 12-293*, current flows inward on side A and outward on side B. The magnetic field about B is clockwise and that about A, counterclockwise. As previously explained, a force develops which pushes side B downward. At the same time, the field of the magnets and the field about A, in which the current is inward, adds at the bottom and subtracts at the top. Therefore, A moves upward. The coil rotates until its plane is perpendicular to the magnetic lines between the north and south poles of the magnet, as indicated in *Figure 12-293* by the white coil at right angles to the black coil.

The tendency of a force to produce rotation is called torque. When the steering wheel of a car is turned, torque is applied. The engine of an airplane gives torque to the propeller. Torque is developed also by the reacting magnetic fields about the current carrying coil just described. This is the torque, which turns the coil.

The right-hand motor rule can be used to determine the direction a current carrying wire moves in a magnetic field. As illustrated in *Figure 12-294*, if the index finger of the

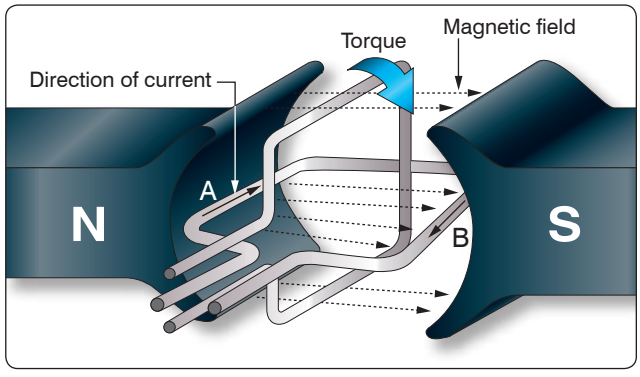

Figure 12-293. *Developing a torque.*

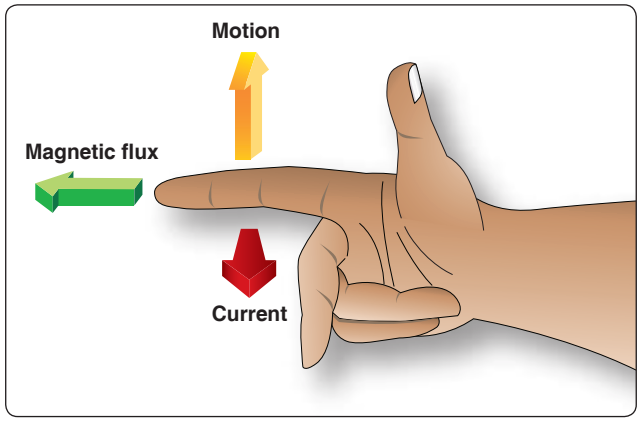

Figure 12-294. *Right-hand motor rule.*