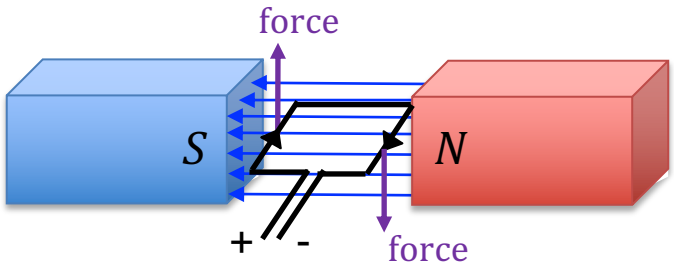
7.3.2 The d.c. electric motor

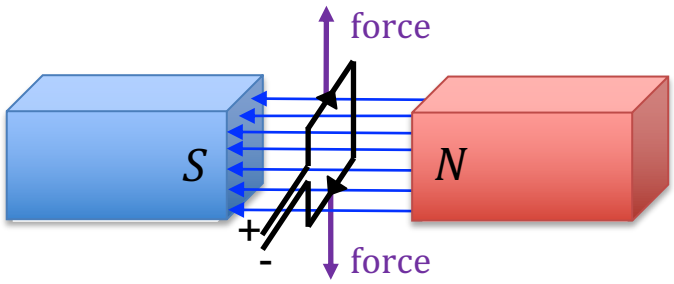
videos

When a coil of wire is placed in a magnetic field, one side of the coil experiences an upward force, and the other side experiences a downward force. This has the effect of rotating the coil.



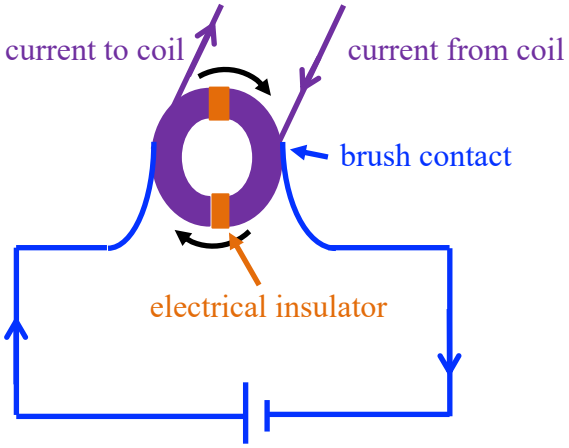
(1) What direction does the coil in the diagram (above) rotate?

This rotation continues until the coil is in the vertical position.



No further rotation is possible because the side of the coil which started on the left has a current flowing from the front to the back. This means that the force on this side will always be upwards. Likewise, the side of the coil which started on the right will always have a downward force on it. To allow for further rotation clockwise, the current direction needs to be reversed.

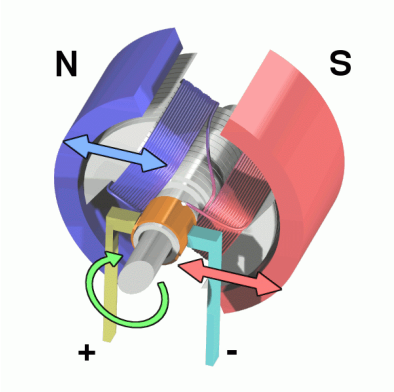
This is achieved with a split-ring commutator.



Brush contacts are contacts that are not fixed, but are touching, allowing current to flow and the coil to rotate. The split-ring commutator reverses the current direction every half turn enabling the coil to continue rotating in the same direction.

You can find a nice animation here:
https://www.walter-fendt.de/html5/phen/electricmotor_en.htm

Electric motors often have multiple coils of wire wrapped around a soft iron core (see diagram). This gives the motor greater torque (strength).



(2) What else can be done to increase the strength of the motor?

(3) What two things could be done to change the direction of rotation of the motor?

(4) Give two examples of devices which use electric motors.