Simple Electric Motor

Apparatus

a loop of enameled copper wire mounted between a pair of magnets, battery

Note - the wire loop needs to be sanded on one side only at each end to allow contact with the battery attachments. It should be sanded on the same side at each end so that as it spins it alternately makes and breaks contact. See diagram below.

Action

The students connect the coil to the battery, and if necessary give it a gentle push to get it started. They should discuss how it works, and why it doesn't stop as does the loop in the demonstration "torque on a current carrying coil in a magnetic field".

The Physics

The current experiences a force due to the external magnetic field from the magnets. On one side of the coil the force is upwards, on the other it is downwards, resulting in a torque on the coil (figure **a**). As the coil begins to rotate the forces will change direction such that of the current still flows they will point in the opposite direction and stop the motion of the coil (figure **b)**. Hence it is important that the current be stopped so that the force become zero. The coil will then continue to rotate, with no force other than friction opposing it, until it returns to its original position. It will then get another push to continue it spinning, and as long as the force due to the field on the current is greater than friction it will continue to spin.

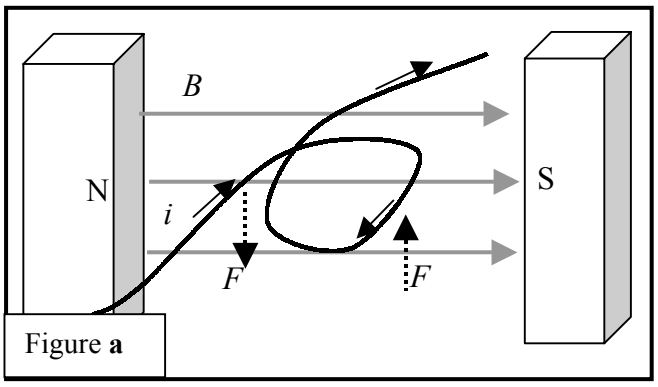

Figure **a**

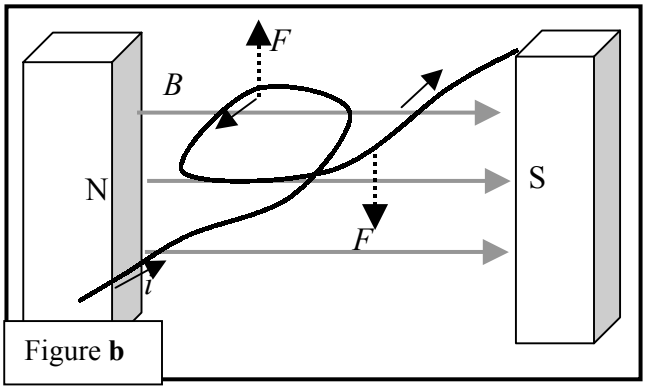

Figure **b**

Accompanying sheet

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What makes the coil spin?

Why doesn't it stop like the single loop in the magnetic field?