MAKING A MAGNET

Magnets are made by several methods:

1. By Contact. When a bar of magnetic material is stroked in *one direction* with a magnet, the bar becomes magnetized. For example, when a bar of steel is stroked in one direction with a magnet, the steel itself becomes a magnet (see Fig. 16-2). After stroking the steel with a magnet, the steel can attract several paper clips. This method is known as magnetizing by **contact.** According to the theory of magnetism, stroking a magnetic substance properly realigns the domains into a regular north-south arrangement.

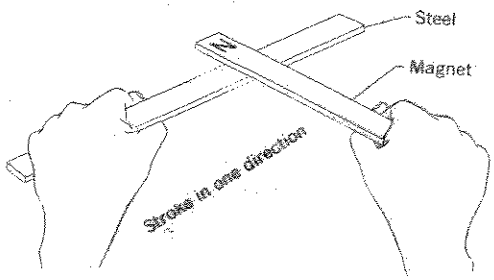

Fig. 16-2. Making a magnet by contact.

It is interesting to note that, when a bar of soft iron is magnetized, it does not remain a magnet for very long. It slowly loses its magnetism and is therefore called a **temporary magnet.** On the other hand, when steel is magnetized, it remains a magnet for a long period of time and is called a **permanent magnet.**

2. By Induction. When a magnetic substance, such as a bar of soft iron, is brought close to a magnet—but does not touch the magnet—the soft iron itself becomes a magnet. As shown in Fig. 16-3, when an iron bar is held near (not touching) a magnet, the bar attracts paper clips. When the magnet is moved away, the paper clips fall from the iron bar. This method of making a magnet is known as **induction.** According to the theory of magnetism, the presence of a magnet near a magnetic object rearranges the domains in the magnetic object.

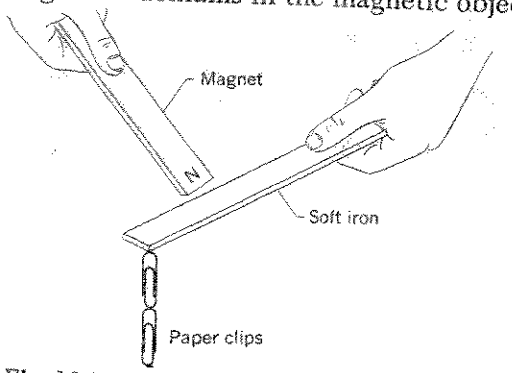

Fig. 16-3. Making a magnet by induction.

Most of the north poles point in one direction and most of the south poles point in the opposite direction. Apparently, the magnetic force extends outward to some distance. Beyond this region, called the **magnetic field,** the magnet loses its power.

3. By Electricity. In 1819, the Danish scientist *Hans Christian Oersted* discovered that a wire carrying an electric current possesses magnetic properties (see Fig. 16-4). In 1820, André Ampère wound a long piece of copper wire, a nonmagnetic substance, into a spring-like coil. He then attached the ends of the coil to a source of electric current. He found that the coil attracted iron and acted like a bar magnet as long as the circuit was closed. When the circuit was broken, the coil lost its magnetism.

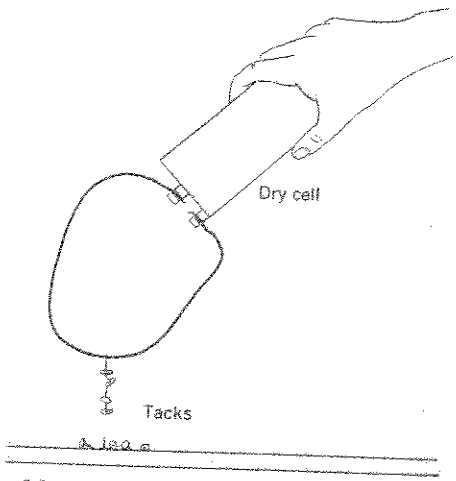

Fig. 16-4. Making a magnet using electricity.

When a magnetic substance is inserted into a coil of wire and the wire is connected to the poles of a dry cell, the magnetic substance becomes a magnet. If this substance is soft iron, it becomes an **electromagnet** (a temporary magnet). If the substance is steel or some other hard iron alloy, it becomes a permanent magnet.